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the Grand Calumet:

EXPLORING THE RIVER'S POTENTIAL

Lake Michigan Federation

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(312) 427-5121

Citizen Action to Protect a Great Lake

June 22, 1984

Mr. Paul R. Johnston
E. I. duPont
5215 Kennedy Avenue
East Chicago, Indiana 46312

Dear Mr. Johnston:

Enclosed please find your requested copy of our report on the Grand Calumet River Basin. This report is the result of two years of study of the river's problems and potential.

It has been presented to Region V - EPA, North Central District-Corps of Engineers, NIRPC and to the State of Indiana; all of the parties who have received it agree that the report includes some important observations and recommendations for improving this tributary to Lake Michigan.

It is with great pride that the Lake Michigan Federation submits the copy of our report and we thank you for your purchase.

Sincerely,

Judith Kiriazis
Executive Director

Enclosure

JK:rpm

the Grand Calumet:

EXPLORING THE RIVER'S POTENTIAL

a report by the

Lake Michigan Federation

Produced with assistance of a special grant from the Joyce Foundation

Dedication

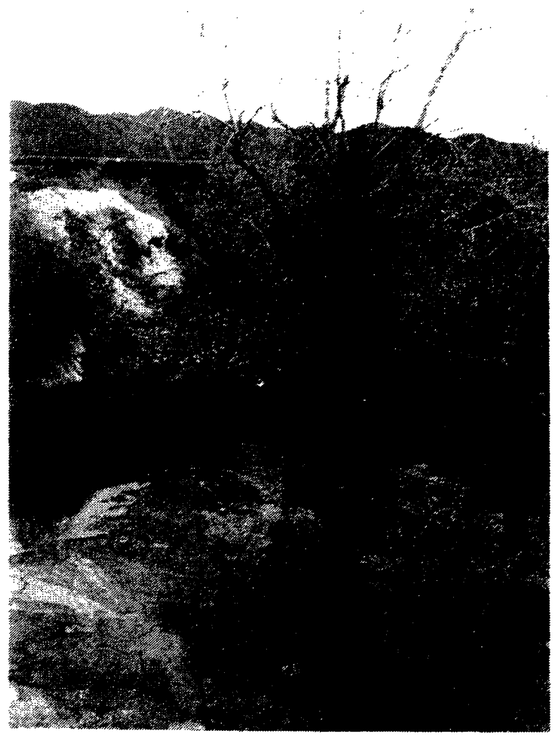
For more than three years the Lake Michigan and its Grand Cal Task Force have been working in northwest Indiana to reclaim the Grand Calumet River. This waterway has endured eight decades of abuse and neglect; the crowning insult was its receiving the lowest use designation of any waterway in the State of Indiana: "industrial waste stream." Some official reports went so far as to claim that the river's headwaters were the outfalls of the first industrial discharge points along its route.

The pictures on this page prove, once and for all, that the Grand Calumet is a real river. Its natural flow begins in Marquette Park Lagoon at the east end of Gary (shown below). Much of the lagoon area is in its natural state, and will remain that way because it is within the boundaries of the Indiana Dunes National Park.

The original connection between the lagoon and the river has been channelized into an underground culvert (about one-quarter mile in length) to facilitate truck and railroad traffic across steel plant property. The culvert is almost--but not completely--silted up, but a definite westerly flow still gets through it and the porous, sandy soils around it.

The photos at right show the easternmost section of the Grand Calumet River, with open waters flowing for at least 300 feet before receiving any effluent from man-made outfalls. In mid-winter, the Grand Calumet--reputed never to freeze--is frozen over for portions of this stretch.

It is to this real river, this tributary to Lake Michigan, known as the Grand Calumet, which shows even more surprising potential than problems, that this River Basin Report is dedicated.



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Introduction

What Can A River Basin Report Accomplish?

Much has been discovered and written about the Grand Calumet River/ Indiana Harbor Canal during the past twenty years. Research data has been gathered about water and sediment quality by several agencies, inventories of several natural areas have been conducted, and myriad reports published describing conditions in the river. Yet nowhere does there exist one, single paper that summarizes water quality and land use issues, and at the same time, makes recommendations for improvements.

In a critical sense, this report describes, then cites reasons for, the severe water quality problems that have plagued the Grand Calumet River for decades--problems that have by no means been solved. But in a more positive sense, we have published a forward-looking exploration of the potential of an abused river system for revitalization--a realistic hope for the future. In this respect, our report is unique, a blend of the scientific with the social, the quantitative with the qualitative.

Ideally, this report can be both a resource for basic information about the river, and a "trial balloon" that demonstrates the possibilities that can be explored and the rewards that can be gained by funding of a comprehensive river basin plan endorsed by the local governments. Our report has been written for an audience that encompasses several groups--private citizens, environmental professionals, elected officials and other community leaders.

For the past three years, the Lake Michigan Federation has worked to develop the Grand Cal Task Force, a group of northwest Indiana residents that focuses on community organizing and education to achieve improvements in the river. A small group that began with a few interested environmentalists, the Task Force has grown to include representatives of many sectors: organized labor, community interest groups,

industry and business, and local governments. This report will serve as a primer on river issues for the Grand Cal Task Force, which has begun the challenging process of becoming an autonomous group.

Perhaps most importantly, this document will redirect both citizen and government attention on a waterway that has been written off as an industrial ditch. In publishing this Preliminary River Basin Report, the Lake Michigan Federation's purpose is not to make accusations, to assess blame; but to generate creative, workable solutions that will benefit the communities in the Grand Calumet River basin and, at the same time, improve water quality in Lake Michigan.

The Grand Calumet River:
A Description and Brief History

From its source near Marquette Park Lagoon, the Grand Calumet River flows westward through Gary, East Chicago and Hammond for approximately thirteen river miles to the Indiana-Illinois border. The river's course roughly parallels the shore of Lake Michigan, to which it is connected by the Indiana Harbor Canal. Just west of the Marquette Park Lagoon the river has been redirected through an underground conduit, then resurfaces near the first outfall of U.S. Steel.

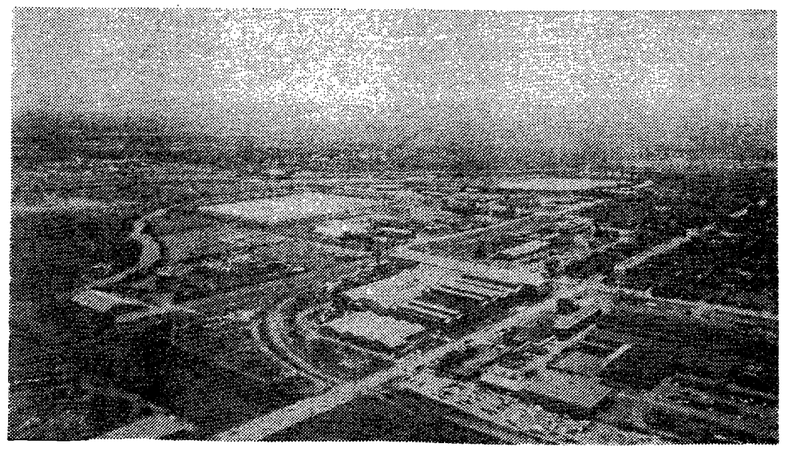
The Grand Calumet River has the unique distinction of flowing in three different directions, depending on which stream segment is being considered. Near the Hammond municipal wastewater treatment plant, the west branch of the river (west of the canal) is bisected by a natural divide. West of this divide, the river flows westward into Illinois, where it eventually enters the Mississippi drainage basin via the Cal-Sag Channel. East of the divide, however, the west branch flows eastward until it joins the westerly moving waters of the river's east branch--together both flow north into the Indiana Harbor Canal and into Lake Michigan.

The original flow patterns were quite different. Until the beginning of the 19th century, the Little Calumet and Grand Calumet Rivers were part of the same river that meandered first westward, then eastward among dune swells and swales, and eventually emptied into Lake Michigan at Marquette Park. However, Indians using the area for canoe transport created a channel through the marshes that diverted much of the Grand Calumet's flow; eventually the mouth of the river became silted over.

When industries that were built in northern Indiana at the turn of the century began discharging into the river, the effluent greatly increased the river's flow once again, and caused it to flow eastward. In 1909, the first mile of the Indiana Harbor Canal was completed, once again changing the nature of the Grand Calumet, making it a tributary to Lake Michigan at Indiana Harbor. Although the canal met the demand for an access route for barges bringing raw materials to the steel mills (it is still dredged by the Army Corps of Engineers to a depth of approximately thirty feet), it has been a double-edged sword that also provides a route for pollutants into Lake Michigan.

Both the direction and volume of the flow in the Grand Calumet River are subject to dramatic variations that depend on winds, wastewater discharges and storm water runoff. The west branch is almost always sluggish, because the Hammond sewage treatment plant is the only major discharger. The flow in the east branch, by contrast, is often rapid as a result of the 368 million gallons per day of wastewater discharged by U.S. Steel.

A heavy load of suspended solids gives the Grand Calumet a greyish cast, and discharges from industrial outfalls create a visible film of oil and grease. The river's bottom is covered by a combination of mud, sludge and organic matter--sediments more than ten feet thick in some places.



Fresh underground springs do feed into the river in places. The impact of these springs can most easily be seen at Roxana marsh, where water quality is substantially better than other parts of the river. However, it is estimated that 90 percent of the flow of the Grand Calumet is treated wastewater.

The river flows through three cities--Gary, Hammond, and East Chicago--with a combined population of more than half a million people. In fact, thousands of those people live within a stone's throw of the river. Just west of its source in Gary, the river forms the northern edge of a large residential neighborhood. West of Indianapolis Blvd. in East Chicago, the Roxana neighborhood lies on the south edge of the river. Adjacent to Roxana, Hammond residents are within walking distance of the river and Roxana marsh. Several schools and parks within these residential communities share the riverfront.

Large parcels of land along the river are also occupied by industry--most notably steel mills (e.g., U.S. Steel owns eight miles along the northern bank of the Grand Calumet in Gary). The implications of this industrialized waterfront will be explored in detail later in this report.

Hundreds of acres of natural areas--wetlands, woodlands and dune and swale ecosystems--are a more unexpected part of the Grand Calumet River basin. These features of the river will be critical in the evolution of a plan to restore beneficial uses, and will be discussed in the Natural Areas Inventory of this report.

Water Quality Issues

Pollutants in the Grand Calumet River

An Overview of Sources

The range of pollutants found in the Grand Calumet River/ Indiana Harbor Canal* is testimony to the industrialization of Lake Michigan's southern shoreline. The pollutants found in the river system and in the sediments are often easily identified with the activities and manufacturing processes that occur along its banks. Water quality in the river system thus is affected by both conventional and toxic pollutants generated by such local activities. "Conventional" pollutants include biochemical oxygen demand (BOD), suspended solids, fecal coliform bacteria, pH and oil and grease--in other words, pollutants typically found in ordinary municipal sewage. A list of toxics-pollutants which can cause serious and permanent injury to human health or the environment--has been developed by Congress, and includes 129 "priority pollutants" that encompass chemicals such as solvents and pesticides, and heavy metals such as lead, cadmium and mercury. (See Appendix for priority pollutants list.)

Discharges of pollutants to surface waters can come from point sources (discrete sources like outfall pipes), or from nonpoint sources, such as urban or agricultural runoff, leaking landfills, or overflows from combined sewers. Pollutants commonly found in the river and canal include: BOD, suspended solids, oil and grease, ammonia-nitrogen, iron, fecal coliform bacteria and toxic pollutants such as lead, cyanide, phenol, arsenic, PCBs and mercury.

The municipal sewage treatment plants of Hammond, East Chicago and Gary are responsible for the point source discharge of treated wastes from the plants, as well as untreated wastes from combined sewer overflows. At fifteen different combined sewer overflow points, the Grand Calumet River receives untreated sewage and industrial wastewater that completely bypasses the treatment plants whenever rainfall exceeds 1/10 of an inch in a 24-hour period. Together, the plants' treated wastes and the bypassed wastes contain conventional and toxic pollutants.

Although waste from sewage treatment plants and combined sewer overflows is commonly associated with fecal bacteria (a frequent cause of beach closings) and oxygen depletion, it can also contain toxic materials. In addition to typical household wastes, all three of the treatment plants on the Grand Calumet receive discharges from the industries in the river basin. Although the industries that discharge to municipal systems on the Grand Calumet are required to pay a "user fee" to help cover the cost of treatment, these discharges may still cause problems. Toxic substances that reach the plant may interfere with the plant's operation; they may pass through to receiving waters; or they may contaminate the sludge, making safe disposal difficult and costly. Pressure is mounting to induce industries to "pretreat" their wastewater, removing the toxics before it is discharged into the sewers. The industrial pretreatment issue will be discussed later in the report.

Sludge contamination has been a serious problem with all three cities along the Grand Calumet River. For example, the wastestream from steel mills contains heavy metals, which tend to settle out during treatment, and remain behind in the sludge. This is a problem that directly affects the river because Hammond's sludge storage lagoons, adjacent to the Grand Calumet, have routinely overflowed. Currently, the Hammond Sanitary District is a defendant in a lawsuit filed by the U.S. on behalf of EPA to stop the filling of sludge lagoons beyond their capacity.

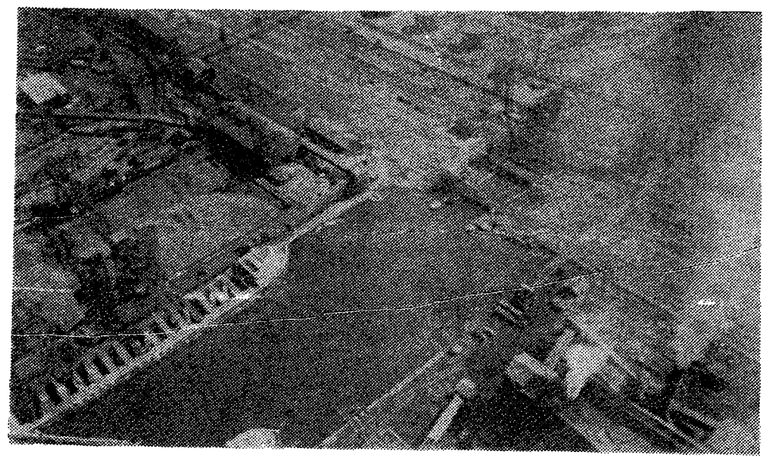
All three sewage treatment plants are subject to state-issued permits, which limit the amounts of pollutants they can discharge, but these do not apply to combined sewer overflows. Although Hammond and Gary's plants are meeting their permit requirements, these permits include few toxics limitations. East Chicago is not in compliance with its permit conditions, and no significant progress can be expected in the near future.

Industrial point source discharges are another major contribution to the total loading of pollution in the Grand Calumet River system. Fifty different outfalls are located in the river and canal. Together, they are a major source of the river's flow. For example, the largest single discharger, U.S. Steel, discharges 368 million gallons of process and cooling water per day from fourteen different outfalls. This wastewater, called effluent, makes up about 90 percent of the flow in the east branch of the river. U.S. Steel's effluent contributes thousands of pounds per day of suspended solids, iron, oil and grease, cyanide, phenols, ammonia-nitrogen, and smaller

amounts of toxics such as mercury, lead, zinc and chromium. Other factories along the river system includes Harbison-Walker, U.S. Lead, duPont, Blaw-Knox, Inland Steel, and J & L Steel. These comprise one of the largest concentrations of heavy industry on the Great Lakes.

Much less is known about the extent and proportional impact of nonpoint source pollution on the Grand Calumet River. Such sources are difficult to identify and measure, but it is known that there are eleven dumps and landfills, and 26 surface impoundments (such as industrial holding lagoons) near the Grand Calumet River. Enforcement action is being taken under the Clean Water Act or the Resource Conservation and Recovery Act (RCRA) to clean up some of these sites.

Because these sites may contain hazardous materials, and are often built on wetlands (whose soil is very permeable), there is little doubt that groundwater could be adversely affected, although this has not been documented. Groundwater in the river basin eventually flows into the river itself. Urban runoff from highly-paved industrial sites carries some pollutants into the river system, but at this writing there is no federal program to regulate nonpoint source pollution.



How These Pollutants Affect Water Quality

The effects of toxic pollutants on a stream varies depending on a variety of factors, including, the flow of the stream, the character of the substance and the amount discharged. High concentrations of toxics can have acute (severe, immediate) effects on aquatic life, causing large die-offs in the existing population, and long-term damage to the ecosystem. But the impact of toxics is usually more subtle, and results from relatively low concentrations discharged over a long period of time. Some toxics are soluble, and are quickly diluted by the stream; others, such as heavy metals and PCBs, are more likely to settle to the bottom, where they become attached to sediment particles and, if persistent, remain toxic for years. Some organic toxics, however, do degrade fairly rapidly.

Biodegradable wastes, whether they are toxic or conventional, pose another problem for the river--they demand oxygen sorely needed by fish and other aquatic life to survive. Sewage wastes are the biggest source of this biochemical oxygen demand (BOD) in the river-a fact documented by monitoring near the sanitary district discharges. Near the Hammond and East Chicago treatment plant outfalls, dissolved oxygen (DO) levels have dipped to below 1 mg/l (5 mg/l is the minimum for a thriving fish population). In the east branch of the river, where oxygen levels are usually above 5 mg/l, problems are more related to pollutants which are toxic to aquatic life, such as cyanide and phenol. This type of degradation can be seen most dramatically in the absence of aquatic life other than sludge worms and, more recently pollution-tolerant fish such as carp, found mostly in the river's east branch.

Because many of the pollutants that accumulate in the bottom sediments of the river are persistent, their concentrations continue to increase, presenting one of the most serious threats to water quality in the Grand Calumet. Levels of contaminants such as lead, arsenic, mercury, nickel, PCBs, PAHs (a group of carcinogenic compounds), and chromium have accumulated to as much as thousands of parts per million (ppm), making it difficult if not impossible to safely dispose of the sediments, which in some areas are twenty feet deep. Evaluated using criteria developed by EPA, the sediments are "heavily polluted" for almost every pollutant measured.

As the river becomes choked with contaminated sediments, it is deprived of oxygen, and polluted further as the toxics in the sediments become resuspended by (bottom-feeding fish) and micro-organisms, or by the scouring action of the flow. "Hot spots" of contamination are created as currents in the east branch scour out the stream bottom and pile up the sediments in various depositional areas. In the west branch, the flow is much slower and often nonexistent; therefore, contamination of the sediments is more uniform and more easily identified with specific discharge points. The actual extent to which these "in-place" pollutants contribute to the overall water quality in the river is one of many unanswered questions.

Water Quality Issues

How the Grand Calumet River System Affects Lake Michigan

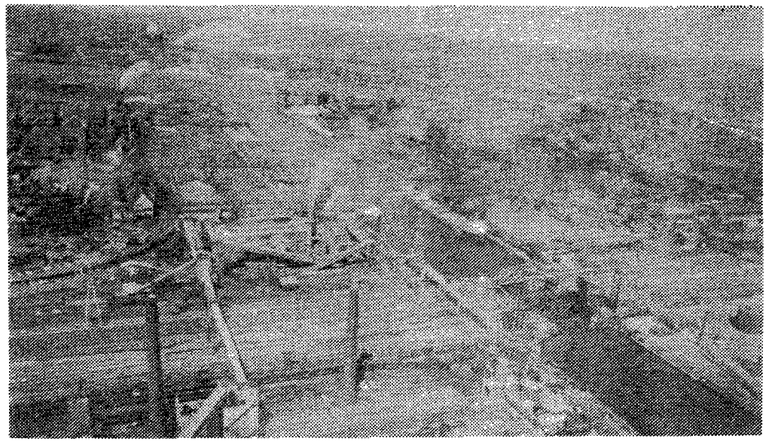
Few experts dispute the fact that the Grand Calumet River/ Indiana Harbor Canal is the single most significant source of pollution to the southern end of Lake Michigan. U.S. EPA, the State of Illinois and the Metropolitan Sanitary District of Greater Chicago have each, on various occasions, successfully sued both industries and the sanitary districts of Hammond, East Chicago and Gary for contributing to pollution that has contaminated the lake. Water quality monitoring has documented higher nearshore levels of pollution in the Indiana portion of the lake; and aerial photos and scientific studies substantiate the theory that pollutants from the Indiana Harbor Canal travel out into the lake as far as five miles, and even farther along the shore, in what has been described as a "sinking plume."

There is no question that inputs of conventional pollutants from the river system have an adverse impact on Indiana nearshore areas (some beaches in the area have been closed for years); however, conclusions about what happens to those pollutants as they are dispersed into the lake have been drawn principally by results of water sampling. Conventional pollutants in the lake have been visually identified, measured, analyzed and modelled much more frequently than toxics, about which much less is known once they enter Lake Michigan. A pragmatic approach has been to assume that a reduction in inputs of toxics will have a positive effect on water quality in the lake. Although water quality standards for toxics usually are not exceeded beyond the nearshore area, water which may be safe to drink may still contain levels of toxics that become significant by the time they bioaccumulate through the food chain. The uptake of persistent toxics by fish is an increasing threat to the fishery of Lake Michigan and other Great Lakes, and ultimately to human health.

In fact, the Indiana Department of Natural Resources has issued an advisory warning people to limit consumption of trout and salmon from the Indiana portion of the lake. In these species, levels of PCB, DDT, chlordane and dieldrin have exceeded recommended limits.

Much of what we do know about the dispersion of pollutants from the Indiana Harbor Canal into Lake Michigan was discovered in the early 1970s and published by the EPA in 1974. (15) This study described the now well-known effluent "plume" theory: By taking aerial photos of a plume of pollutants spreading lakeward from the mouth of the Indiana Harbor Canal and cross-checking these photos with a sampling of "tracer" pollutants, IIT was able to describe the direction and dispersion of the plume, and identify some of the physical factors-such as lake currents, vertical mixing, and nearshore buildup of pollutants--that affect the fate of pollutants from the canal. Completed when regulatory emphasis was on conventional pollutants, this study made no conclusions about the fate of toxics such as metals or organic chemicals. However, it was important because it left little doubt that pollution from the canal was affecting the lake, and could have an impact on drinking water supplies and recreational use.

The IIT study did not address the "sinking plume" conditions that are present in winter, the season when they are most likely to affect the Chicago shoreline. The State of Illinois suspected that the sinking plume could be the cause of winter contamination as far north as the



South Water Filtration Plant. To find out if there were a connection, the Illinois Institute for Environmental Quality (now the Illinois Department of Energy and Natural Resources) asked Argonne National Laboratories to trace the Indiana Harbor Canal's "sinking plume" during winter months to confirm a causal relationship. (4) Argonne was also asked to go beyond the scope of the IIT study by tracing organic chemicals from the harbor to the filtration plant.

Argonne was able to prove conclusively that, under certain conditions, effluent from the canal moved northward to contaminate intake water at the Chicago raw water intakes. They accomplished this by adding substances called "tags" to canal water and to a simulated oily waste that was spread over the canal water. Movement of the plume could than be traced by measuring the level of this "tag" at the mouth of the canal, numerous points in the lake, and finally at the raw water intakes themselves.

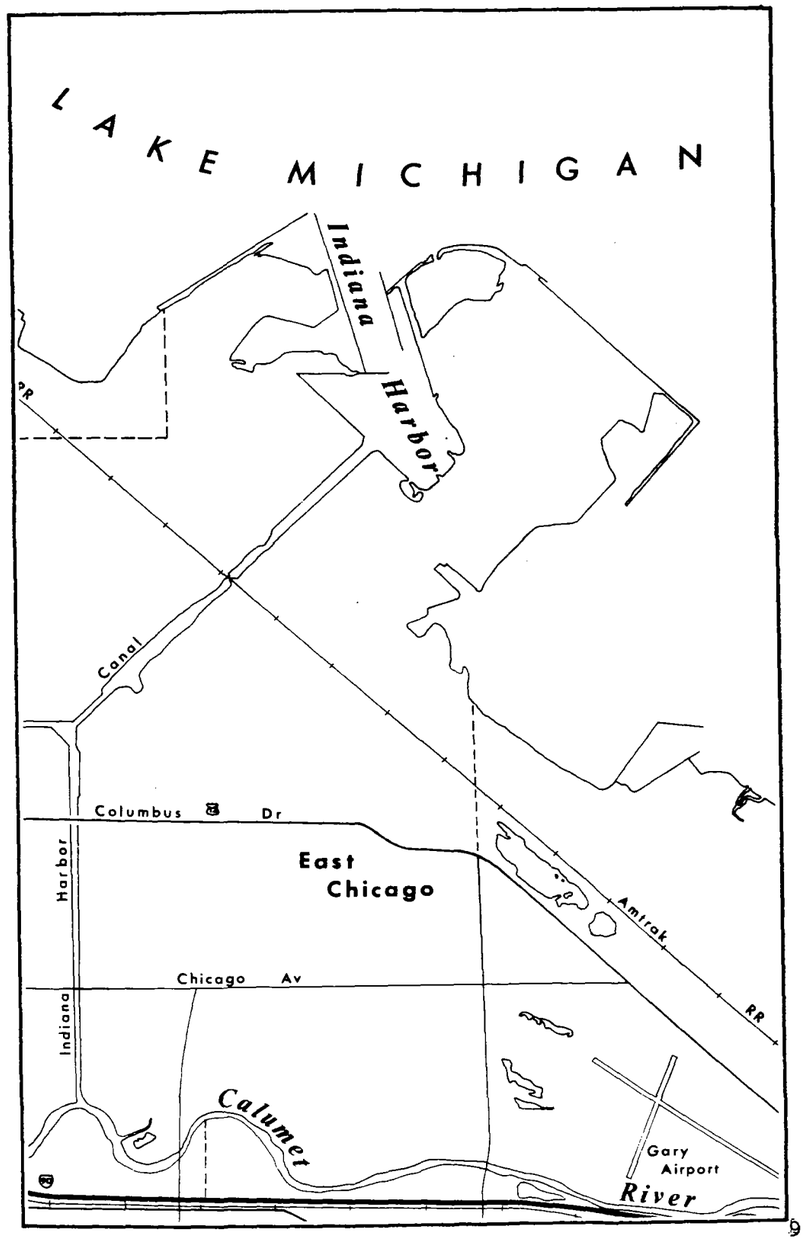
The Argonne team also described a "worst case" scenario--a combination of physical conditions most likely to result in a sinking plume that would affect Chicago drinking water supplies. In its conclusions, the 1977 Argonne study pointed to the need for a model that could predict the fate of a toxic plume that could result from a significant accidental discharge from the Indiana Harbor Canal. To this date, no sophisticated computer modelling of toxics from the canal into the lake has been done.

The most recent study that attempted to reach conclusions about the impact of the river system on Lake Michigan is "Physical & Chemical Characteristics of the Indiana Portion of Lake Michigan, 1980-1981," completed in 1982 by the Division of Water Pollution Control of the State Board of Health of Indiana. (8) The study encompassed a massive sampling strategy that divided the southern end of Lake Michigan into one-mile quadrants. Water samples were tested for temperature, conventional pollutants, cyanide and phenol and some heavy metals. Analysis for toxic organics was limited because "current technological limitations prohibit routine sampling for organic parameters down to levels currently found in Lake Michigan." (8)

A major conclusion of this report described a "thermal bar" which develops in the spring, and effectively prohibits mixing of nearshore water with those waters away from shore. This theory is supported by greater differences between pollutant concentrations nearshore and offshore during the spring. While this lack of mixing during certain months can be beneficial to Lake Michigan water quality farther from shore, it causes more frequent and greater violations of water quality standards in nearshore areas, virtually trapping pollutants within a vertical temperature barrier.

In 1983 the Indiana State Board of Health contracted with a consulting firm to complete a "Waste Load Allocation" study of the Grand Calumet River system. This study, which will be described in a subsequent section, will include an assessment of the system's impact on Lake Michigan, and will rely heavily on existing data gathered by some of the studies already mentioned.

Much has already been learned about the factors that affect dispersion of pollutants from the canal; however, it is time to begin exploring the fate of toxic chemicals and metals. Now that more is understood about the importance of low levels of toxicants in water, and the implications of those toxics in the food chain, it is necessary to develop the means of measuring substances at levels never before thought significant.



Current Policy

An Overview of Regulatory Jurisdictions

Most of the regulatory programs that exist to protect water quality in the Grand Calumet River system have been mandated by the Clean Water Act, first passed in 1972 as the Federal Water Pollution Control Act, then amended in 1977. This Act is administered at the federal level by U.S. EPA, and encompasses such diverse programs as grants for construction of sewage treatment facilities, development of state water quality standards, wetlands protection, pollution control requirements for industry, and pretreatment of industrial wastes sent to municipal treatment plants.

These federal programs are often implemented by an appropriate state agency, and are supervised by the regional office, (Region V) of U.S. EPA. In Indiana, the Water Pollution Control Division of the State Board of Health administers most of the programs, and carries out the policy directives and enforcing regulations developed by the Indiana Stream Pollution Control Board. In turn, the staff of EPA, Region V in Chicago assists the state in planning, evaluating and enforcing its programs. EPA also has authority over programs that have not yet been delegated to the State of Indiana (e.g., the pretreatment program).

Under S 404 of the Clean Water Act, the U.S. Army Corps of Engineers has authority over the filling of wetlands. The Corps is, therefore, responsible for issuing or denying permits to anyone wanting to place fill in a wetland on the Grand Calumet River. The Corps also performs maintenance dredging of the canal and harbor when necessary to maintain navigational access.

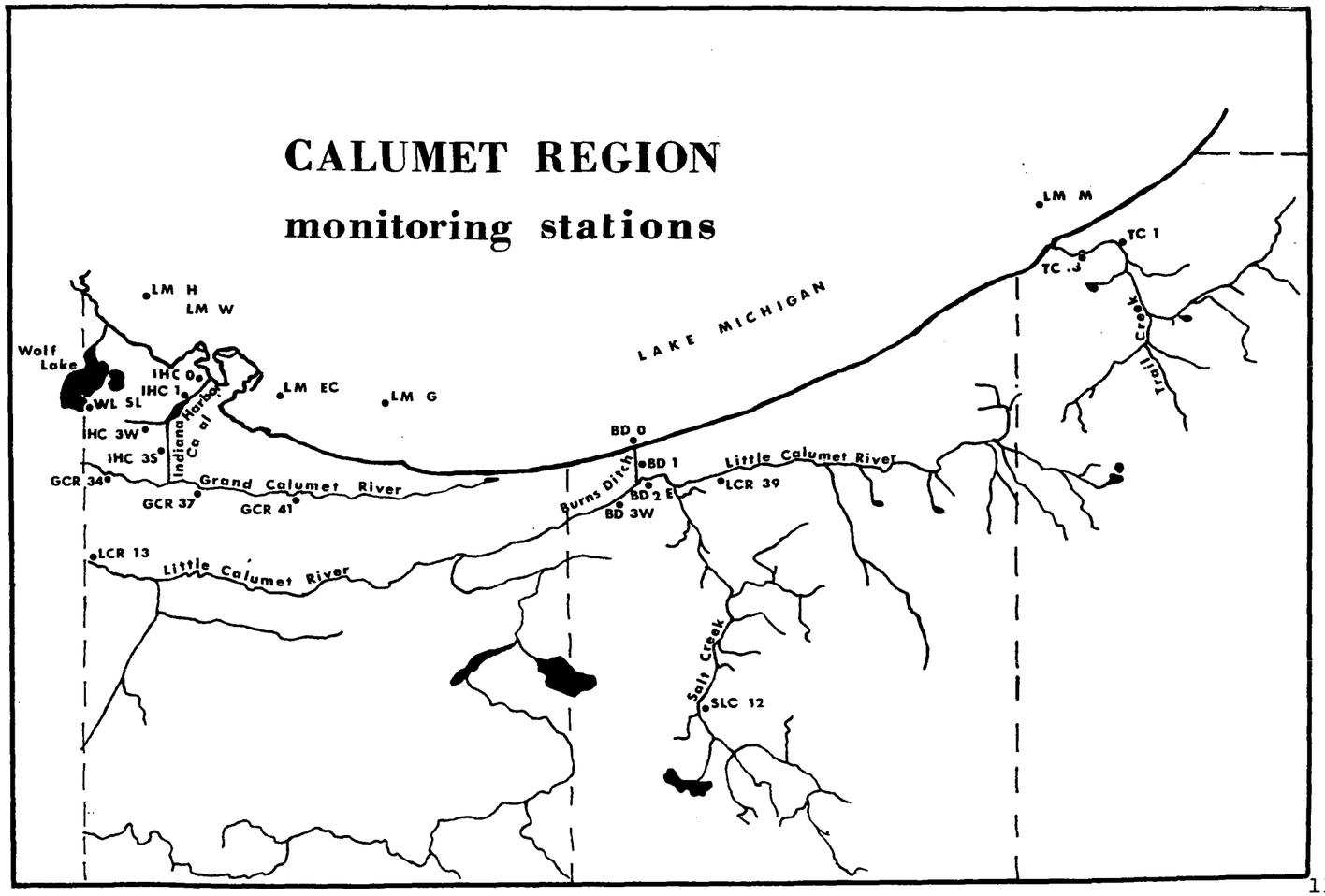
PARAMETERS MEASURED AT GRAND CALUMET RIVER
AND
INDIANA HARBOR CANAL STATIONS
(1982)

Parameter	Station Code GCR-34	GCR-37	GCR-41	IHC-0	IHC-1	IHC-3W	IHC-3S
Alkalinity	X	X	X	X	X	X	X
Ammonia	X	X	X	X	X	X	X
Arsenic				X	X		
BOD	X	X	X	X	X	X	X
COD	X	X	X	X	X	X	X
Cadmium	X			X	X		
Chlorides	X	X	X	X	X	X	X
Chrome-Hex				X	X		
Chrome-Total	X	X	X	X	X	X	X
Coliform-Total					X		
Coliform-Fecal	X	X	X	X	X	X	X
Copper	X			X	X		
Cyanide	X	X	X	X	X	X	X
Calcium ($CaCO_3$)					X		
Dissolved O_2	X	X	X	X	X	X	X
Fluoride					X		
Hardness ($CaCO_3$)	X	X	X	X	X	X	X
Iron	X	X	X	X	X	X	X
Lead	X	X	X	X	X	X	X
Manganese				X	X		
Magnesium ($CaCO_3$)					X		
Mercury	X	X	X	X	X		X
Nickel				X	X		
NO_2 & NO_3	X	X	X	X	X	X	X
Nitrogen - TKN	X	X	X	X	X	X	X
Oil & Grease	X	X	X	X	X	X	X
pH (field)	X	X	X	X	X	X	X
pH (lab)	X	X	X	X	X	X	X
Phenol	X				X	X	X
Phosphorus	X	X	X	X	X	X	X
Potassium					X		
Silica					X		
Sodium					X		
Solids, Dissolved					X		
Solids, Suspended	X	X	X	X	X	X	X
Solids, Vol.					X		
Solids, Total					X		
Spec. Conductivity	X	X	X	X	X	X	X
Sulfate	X	X	X	X	X	X	X
Temp. (deg C)	X	X	X	X	X	X	X
TOC (org. carbon)	X	X	X	X	X	X	X
Turbidity	X	X	X	X	X	X	X
Zinc		X	X	X	X	X	X

(Excerpted from Water Quality Monitoring - Rivers & Streams, 1982)

LOCATION OF STATE MONITORING STATIONS
ON THE GRAND CALUMET RIVER AND
INDIANA HARBOR CANAL

Station	Location	Period of Record
GCR 34	Bridge on Hohman Ave., Hammond	1958-present
GCR 36	Bridge on Indianapolis Blvd., East Chicago	1964-1967
GCR 37	Bridge on Kennedy Ave., East Chicago	1964-1979, 1981-present
GCR 41	Bridge on U.S. Highway 12 Gary	1964-present
IHC 0	Mouth of Ship Canal, East Chicago	1973-76, 1978-present
IHC 1	Bridge on Dickey Rd., East Chicago	1964-present
IHC 3W	Bridge on Indianapolis Blvd., East Chicago	1964-present
IHC 3S	Bridge on Columbus Drive, East Chicago	1964-present



Current Policy

Setting the Stage for Improvement: Water Quality Standards

The federal Clean Water Act requires each state to adopt water quality standards for its surface waters that will result in attainment of the goals of the Act. These standards are most commonly expressed as the maximum amount of a pollutant allowed in the stream, and are often written as a concentration (e.g., milligrams/liter, parts per million). Standards can also be written narratively (e.g., "all waters shall be free from substances which are in amounts that will be toxic or harmful to humans, animals, plants or aquatic life").

U.S. EPA provides detailed guidance to states via its Water Quality Standards regulations, which explain how to set standards that will achieve a level of water quality compatible with the "designated use" of the waterway. (This use is assigned by the state.) For example, a stream designated "fishable-swimmable" must be cleaner than a stream designated "industrial water supply," and as such will probably require stricter standards. In addition, EPA's Quality Criteria for Water provides states with background documentation and suggested numerical standards for achieving fishable-swimmable water quality--the ultimate goal of the Clean Water Act.

Water quality standards do not have the force of law; they are guidelines for assessing stream water quality and developing necessary pollution control programs. But more importantly, water quality standards should be a foundation for determining what kinds of additional controls may be needed (beyond the technology-based controls required by the Clean Water Act) to make a stream clean. For example, if facilities discharging pollutants to the Grand Calumet are meeting all the requirements of their permits, but standards in the river itself are still being violated, the State of Indiana has the authority to make permits stricter so that water quality standards are met.

The Indiana Stream Pollution Control Board (ISPCB) has developed five distinct sets of water quality standards for Indiana waterways, based on the beneficial uses of these waters. The titles of regulations are listed below (note that the Grand Calumet River has its own set of regulations):

330 IAC	1-1	Remaining Waters of Indiana
330 IAC	2-1	Lake Michigan and Harbor Areas
330 IAC	2-2	Grand Calumet River and Indiana Harbor Ship Canal
330 IAC	2-3	Wolf Lake
330 IAC	2-4	Natural Spawning Areas and Migration Routes of Salmonid Fish

Citing the "unnatural character of these stream beds," and pointing out the high flow volume of industrial and municipal wastewater, the Board classified the Grand Calumet as "partial body contact, limited aquatic life and industrial water supply." (9,10) This use designation allows the Division of Water Pollution Control of the State Board of Health to set water quality standards that are much less stringent than those established for recreational use waterways (e.g., the "Remaining Water of Indiana" listed above). However, the Grand Calumet, although a "working river," flows unimpeded into the southern basin of Lake Michigan, which is a national resource and the drinking water supply for nearly ten million people. At this time, the state is not required to include that tributary status when determining a use designation(s) and its corresponding standards.

Water quality standards for the Grand Calumet River were issued in 1973 under the new Clean Water Act, and then were revised in 1978. Even though the water quality in the river improved in many ways during those five interim years, the State of Indiana relaxed the standards for several pollutants when the standards were revised in 1978: total dissolved solids, oil and grease, chlorides, and sulfates. On the other hand, standards were added for PCBs and persistent substances (those that do not easily degrade).

To monitor the attainment of water quality standards, the State Board of Health's Water Pollution Control Division takes water samples from the river and canal at seven different locations (see map of monitoring stations). These samples are analyzed for pollutants for which there are standards, as well as some additional toxics, such as heavy metals.

Water quality standards for several pollutants are routinely violated at some monitoring stations. These pollutants include: dissolved solids, chlorides, sulfates, phosphorus, oil and grease, ammonia-nitrogen, cyanide, phenols and mercury. Such violations can largely be attributed to sewage treatment plants, which will continue to discharge large amounts of toxics until industrial pretreatment programs are implemented.

Comparison of monitoring results over the years shows that water quality for some pollutants in the river is improving. This can especially be said for discharges from steel mills and other industries which have been forced by federal law to install pollution control equipment. Increased compliance with environmental regulations has led to reductions in total inputs of cyanide, phenol, suspended solids, oil and grease, and has increased the dissolved oxygen level in the wastewater going into the Grand Calumet system. In contrast, plant treatment techniques that reduce toxics like cyanide and phenol have resulted in an increase of chlorides and sulfates.

Water quality standards for the Grand Calumet River system, and the use designation the standards are based upon, can be upgraded if strong public support is demonstrated. The regularly scheduled review process includes public participation through comment periods and hearings. In addition, any person may request a change in the use designation of a state waterway, if that proposal is supported by reasons and includes a petition signed by at least 200 people.

Current Policy

Point Source Control Programs

Pollution control requirements for facilities that discharge wastes to surface waters are based on the level of removal that can be achieved using available, affordable pollution control equipment. Uniform effluent standards for dischargers are being issued by EPA for each of 34 industrial categories that account for the most serious water pollution. These "technology-based" standards are the foundation of all programs that control point source pollution. Water quality standards for the stream provide the bottom line; if effluent limits issued by EPA are not strict enough to meet in-stream standards, more stringent controls can be required.

Three basic federal programs under the Clean Water Act are designed to control the types and amounts of pollution coming from point sources. They are: 1) the NPDES (National Pollutant Discharge Elimination System) permit program to regulate direct dischargers to a waterway, 2) the construction grants program, which provides federal matching funds to cities for the construction or upgrading of sewage treatment facilities, and 3) the pretreatment program, requiring industries to treat their "indirect discharges" before sending them to the sewage treatment plant.

NPDES

In Indiana, the NPDES program is administered by the Water Pollution Control Division of the State Board of Health. Every factory or municipality discharging to the Grand Calumet River system must have a NPDES permit. Along the river system, 17 facilities are issued permits to discharge from 50 different outfalls. Issued for a five-year period, these permits include general rules regarding water sampling and analysis, reporting of violations, and for each outfall, numerical limits for pollutants entering the stream from that pipe. The limits on the permits are based on the guidelines developed for that industry by EPA.

The first round of permits issued by EPA regulated mostly conventional pollutants, and a few toxics like cyanide and phenols. Theoretically, as EPA developed guidelines for controlling toxics (using Best Available Technology, or BAT), limits were to be added to the second-round permits, now being issued, for toxic pollutants on the "priority pollutants" list.

Along the Grand Calumet River system, of the eighteen dischargers with permits, nine second-round permits have been reissued. In some cases, however, the new limits are not any more stringent than those on the original permit (e.g., in the iron and steel guidelines, issued by EPA, the BAT requirements are equal to the earlier BPT limits in half of the steelmaking subcategories). During the next year, Indiana plans to review and reissue NPDES permits for four dischargers to the Grand Calumet River system. Four additional permits, including those for the three sanitary districts and duPont, will be reissued after the waste load allocation study is completed.

Citizens for a Better Environment (CBE) recently evaluated the state water quality programs in U.S. EPA, Region V, and included a review of Indiana's permit program. According to the CBE critique, lack of staff and a small operating budget has resulted in a permitting backlog of several years. Because there are no field offices in the state to monitor compliance with permits, the state relies heavily on self-monitoring and reporting by dischargers. On-site inspections are infrequent. According to EPA records, all permit holders on the river system are in compliance with their permit limits, with the exception of the East Chicago Sanitary District. The EPA, Region V office handles most of the enforcement action in the state of Indiana when violations do occur. Although the staff of the state's Water Pollution Control Division has a good attitude toward the program, it is seriously hampered by budget problems: the overall program has been rated by CBE as fifth out of six states in Region V. (Since this CBE evaluation, however, additional staff have been hired, several of them assigned to the Permits or Compliance sections.)

Construction Grants

Many of the nation's municipal sewage treatment plants that discharge to waterways would not be able to comply with their permits if it weren't for the construction grants program. All three of the sanitary districts along the Grand Calumet River--Gary, Hammond and East Chicago--have received funds from this federal program. Authorized by the Clean Water Act, the construction grants program allocates funds to publicly-owned treatment works (POTWs) to pay for up to 85 percent of the design and construction costs of upgrading the plant to secondary treatment.

A municipal treatment plant's permit is usually based on removal achievable with secondary treatment. In some cases, though (e.g., the Gary

Sanitary District) the federal money can be used to go beyond secondary treatment, to advanced wastewater treatment, in order to assure that in-stream water qualilty standards are met.

Requirements for meeting NPDES permit limits are not tied to federal funding, but most POTWs do qualify for some level of construction grants funds. Although all three municipal facilities along the river have received construction grants, progress made in meeting design and construction goals varies considerably.

East Chicago is one example of what can go wrong with the federal construction grants program. Even though the sanitary district of that city has received $1.4 million in grants, it has yet to have an approved facilities plan, only the first step in a process that will take years to complete. The municipal plant has a flow of 20 million gallons per day, 70 percent of which is industrial wastewater. Although the facility is designed for secondary treatment, its performance has been so poor that permit limits are routinely violated by several orders of magnitude. A 1980 study by EPA revealed that treated effluent from the plant was still so polluted by toxics that it was acutely toxic to fish, and was mutagenic and carcinogenic. (12) Plagued by operation and maintenance difficulties, the East Chicago plant is just beginning to address its problems with the passage of a $9 million bond issue.

In contrast, the Gary Sanitary District has been meeting the requirements of its NPDES permit, and has completed facilities planning for everything except sludge handling. Construction of plant additions has enabled the Gary facility to meet advanced wastewater treatment standards. The design work and application for the remaining sludge handling part of the plant's operation are expected to be completed by the end of FY 1984.

The dramatic closings of Chicago beaches in 1980, caused by equipment failures at the Robertsdale station of the Hammond Sanitary District, have led to improvements in that city's sewage treatment facilities. A new main sewer has been installed, and Lever Brothers, one of the system's largest users, is diverting its wastes to company owned storage tanks to reduce the burden on the treatment plant. The Hammond Sanitary District is now meeting secondary treatment standards in its NPDES permit, and will soon submit its sludge handling plan to the state for review. The necessity for further controls, including nitrification treatment, will be reassessed upon completion of the current waste load allocation study.

Controls required of direct dischargers through the NPDES permit program, combined with municipal sewage treatment plant improvements through the construction grants program, have already resulted in water quality improvements in the Grand Calumet River system. However, in the Grand Calumet River basin, many factories (e.g., Inland and J & L Steel) send their wastewater to the river system indirectly, via the municipal treatment plants.

Pretreatment

The pretreatment program, a federally-mandated program that will eventually be administered by the State of Indiana, requires industries to pretreat wastewater before sending it to municipal sewage treatment plants. In the past, these "indirect" dischargers have not been required to install pollution control equipment like direct dischargers, unless it was part of a municipal ordinance to protect the plant or the receiving stream. (Many large cities have such an ordinance.) The pretreatment program will be managed at a local level by the publicly-owned treatment works (POTW), if the plant has a large flow (more than 5 million gallons/day) and has major industries discharging to it.

Pretreatment is an important issue for the Grand Calumet River system because of the high concentration of heavily polluting industries in the region. According to point source inventories, the three treatment plants along the river receive industrial wastes from at least fifty different sources. The lack of industrial pretreatment has been cited by EPA as a major source of water quality problems in the river, and no doubt has had a serious impact on the performance of the municipal treatment facilities. (2)

These industrial wastes create special problems for sanitary districts in terms of sludge disposal. Persistent toxics, especially heavy metals, often precipitate out during treatment and remain behind in the sludge, making safe disposal difficult and expensive. For example, the City of East Chicago discharges its contaminated sludge to the Grand Calumet River because the state has not approved local disposal sites. The Hammond Sanitary District is currently one of the defendants in a lawsuit filed to prevent the city from storing its sludge in riverfront lagoons that have long ago reached capacity, and are now steadily leaking into the Grand Calumet River, filling it with sludge.

The effluent from the three treatment facilities on the river may also contain toxic pollutants from industrial wastewater. The toxicity of the East Chicago plant's discharge, mentioned previously, can be attributed to industrial wastes that pass through the facility untreated. Most treatment plants are not designed to handle a heavy load of toxic industrial wastes, but for plants like East Chicago's, where industrial input equals or surpasses the household flow, operation and maintenance problems exacerbate an already serious problem.

The Gary sewage treatment plant has received major renovations, and has recently installed equipment to operate an Advanced Wastewater Treatment system, a level of treatment designed to remove 90 percent of its oxygen demanding wastes. This does not necessarily mean that the Gary plant can or should control toxics. In fact, the Gary facility is now confronting its sludge handling problem, and is considering using a 65-acre wetland adjacent to the Grand Calumet River as a landfill for its sludge. If a new sludge lagoon were created there, it would destroy a prime wetland habitat. In addition, any groundwater contamination that occurred as a result could eventually find its way into the river. At this time, the Sanitary District is evaluating alternative solutions to the destruction of the Grand Calumet wetland (see letter from Fish & Wildlife Service in Appendix).

Local POTWs all across the nation were to have submitted their plans for managing a pretreatment program by July, 1983, but few municipalities have met this deadline. Of the three sewage treatment plants along the Grand Calumet, none has an approved pretreatment program. Most POTWs, including Gary, East Chicago, and Hammond, are now on what EPA calls a "compliance schedule" for gaining program approval during 1984. Individual dischargers to these municipal systems will have to comply with pretreatment limits for their industry within three years of the date they are issued by EPA.

As of this writing, EPA, Region V is administering Indiana's pretreatment program. The appropriate state agency, in this case, the State Board of Health, must apply for delegation of the authority of the pretreatment program. It is expected that Indiana will apply for this delegation eventually. Federal funds under the 205(g) section of the Clean Water Act are available to help states run that program, but in the absence of state delegation, EPA will continue to administer pretreatment.

Current Policy

The three cities along the river have combined sanitary and storm sewers. Because the sewers are combined, heavy rainfalls can overload the systems and, to avoid basement and viaduct flooding or damage to the treatment plant, millions of gallons at a time are discharged into the Grand Calumet River or the canal at fifteen different overflow points. Because these older sewer systems have such a small capacity, the amount of rainfall that produces these bypasses does not have to be very large.

Even though the combined sewer overflows (CSOs) into the rivers come from identifiable pipes, they are considered nonpoint sources because their origins are diffuse, including runoff from streets and industrial sites. CSO water may also contain untreated industrial wastes that have been discharged to sanitary sewers. In Indiana, there are no state laws regulating how CSO pollution must be treated; therefore, NPDES permits are not required, and the dischargers are not monitored.

Funding was available to study the river system's CSO problem under Section 208 of the Clean Water Act. The Northwestern Indiana Regional Planning Commission (NIRPC) received 208 monies to conduct a study of the CSOs on the Grand Calumet River, a study relying on computer modelling to predict the impact of various solutions, from separation of sewers to increasing the capacity of the plant to treat wastes. The findings, published in 1982, summarized the need for sewerage improvements and predicted the impact on water quality associated with each option. (13) Part of the study included input from Hammond and East Chicago, who used a matrix of ranked criteria to decide what type of CSO controls they were interested in implementing. Hammond chose the least expensive alternative, separation of sewers. For East Chicago, CSO discharges were less of a problem than the plant's failure to adequately treat incoming wastes--that city chose the null alternative. Alternatives were not evaluated for Gary, in response to the study's findings that its CSOs affected the river the least.

This NIRPC report was a preliminary step--an exploration of the alternatives for action. Each municipality was to take the information and determine the preferred alternative on its own. At this time, no action has been taken--the State Board of Health is reviewing the study.

Protecting Wetlands

A canoeist paddling downstream on the Grand Calumet River from Gary to Roxana marsh in Hammond encounters an almost continuous stretch of cattail marshes along most of the riverfront. Set back from the river, even larger areas of ponds and marshes thrive, still relatively undisturbed. These wetlands are an asset that is constantly being eroded, destroying available habitat for many species rarely found in industrialized northwest Indiana, and depriving the public of a valuable natural resource.

According to Section 404 of the Clean Water Act, a wetland or waterway cannot be filled without a permit from the U.S. Army Corps of Engineers. The Corps must review a permit application, evaluate the proposed fill in terms of its impact on the stream or wetland (including effects on water quality), then solicit input from other agencies, including EPA and the U.S. Fish and Wildlife Service. Citizens can get involved in this process because a public comment period of about one month follows a permit application and must be granted before a permit can be issued.

Citizen input into the 404 process has already saved at least one important wetland along the Grand Calumet River, and could potentially save many more acres. In 1982, a private citizen applied for a permit to fill a wetland along the river, Roxana marsh in East Chicago. When the Corps issued a public notice of the permit application, organized citizen action resulted in an overwhelming response--the Corps received more than 40 comments opposing the filling of the marsh, which is one of the most unique habitats remaining along the river, and a favorite birdwatching site (see the Natural Areas Inventory for a detailed description of Roxana marsh, and a list of species sighted there).

The same level of public participation can save other valuable wetlands along the Grand Calumet River. For example, if the Gary Sanitary District pursues the option of using a nearby 65-acre wetland for sludge disposal, it may have to apply for a Section 404 and Section 10 permit from the Corps. Wetlands, and other natural areas that have managed to survive near the riverfront, will be described later in the Natural Areas Inventory.

Future Programs

Introduction

Various international, federal and state activities now underway could have a long-term impact on the Grand Calumet River. Many of these projects or programs are authorized by the Clean Water Act or other legislation, but are not part of the routine, ongoing regulatory process discussed in the previous section. The special activities described in this section are:

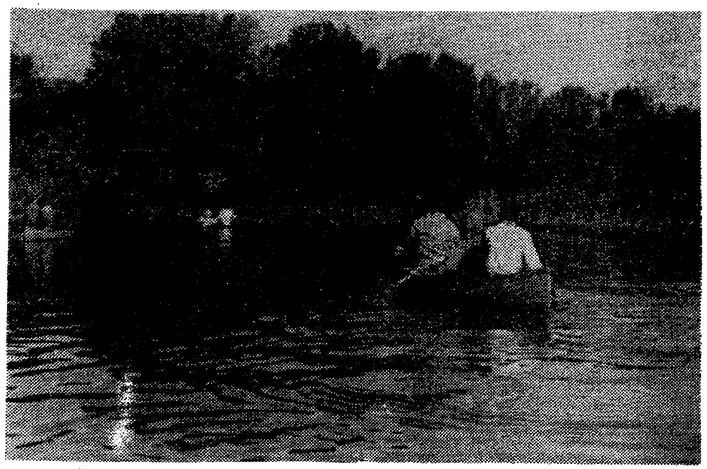
a. Identification of the Grand Calumet River and Indiana Harbor Canal as a "Class A Area of Concern" by the International Joint Commission;

b. EPA, Region V's development of a "Master Plan" for the Grand Calumet River system;

c. The State of Indiana's completion of a new Waste Load Allocation Study on the Grand Calumet River system.

d. U.S. EPA's Toxic Hot Spot program;

e. Maintenance Dredging of the Indiana Harbor Canal;



A "Class A" Area of Concern

The International Joint Commission (IJC), composed of three representatives each from the United States and Canada, is charged with evaluating progress in meeting the terms of the 1978 Water Quality Agreement between those two countries. Although the Commission does not have regulatory or enforcement authority, it can be an effective policymaking body, whose recommendations can become law. Focusing on water quality problems in the Great Lakes, the Commission's Water Quality Board compared fish, water and sediment data with objectives of the agreement, and named 39 major areas of concern in the Great Lakes Basin. Eighteen of these Areas of Concern, including the Grand Calumet River and the Indiana Harbor Canal, were classified as "Class A," and defined as "those areas exhibiting significant environmental degradation and severe impairment of beneficial uses." (3)

All of the pollution problems discussed in this report contributed to the Commission's decision to label the Grand Calumet system a "Class A" area. When reassessing water quality problems in the river for its 1983 report, the Water Quality Board of the Commission found little reason to be optimistic. In its update on environmental conditions and remedial programs, the commission found that "environmental conditions remain unchanged." (3)

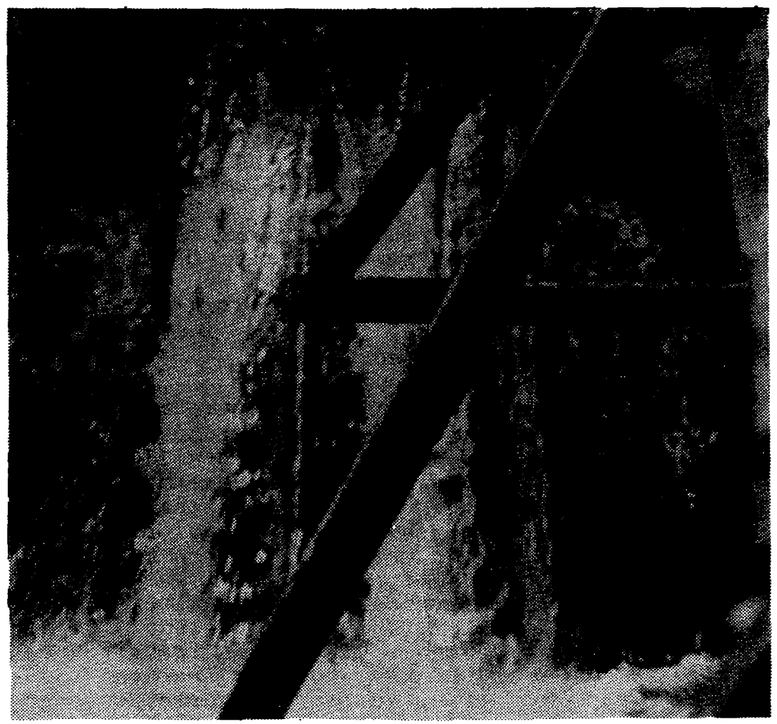
At the November, 1983 bienniel meeting of the IJC, held in Indianapolis, the Grand Cal Task Force met with representatives of the IJC, U.S. EPA, the Indiana State Board of Health and the Army Corps of Engineers to discuss the river's problems. It was during this meeting that EPA Region V Administrator, Valdus Adamkus announced the development by EPA of what he called a "master plan" to address the myriad problems affecting the river. The role of the International Joint Commission was underscored by this transitional meeting, which brought key agencies face to face with a citizens' group to share information and ideas for joint efforts to improve the river.

Future Programs

EPA's Water Quality Master Plan

At the conclusion of the November meeting in Indianapolis, participants agreed to meet on a quarterly basis, under the auspices of EPA's master plan, to continue the dialogue begun at the first meeting. An effective master plan for the river could provide the structure needed for exploring existing conditions in the Grand Calumet and seeking new approaches for solving old problems. EPA's master plan will focus on water quality, and will address at least three major areas of concern:existing conditions in the river and canal;status of regulatory programs currently in place; and, recommendations for action that would ensure continued water quality improvement.

EPA plans on seeking input on its master plan from members of the Grand Cal Task Force, which will respond enthusiastically to this opportunity for participation. Mr. Adamkus predicted that a first draft of a Master Plan for the river and canal would be completed by Spring of 1984. A staff member of EPA, who will be drafting the plan, attended a Task Force meeting at the start of the project, and was taken on a tour of the river by two staff members of the Lake Michigan Federation.



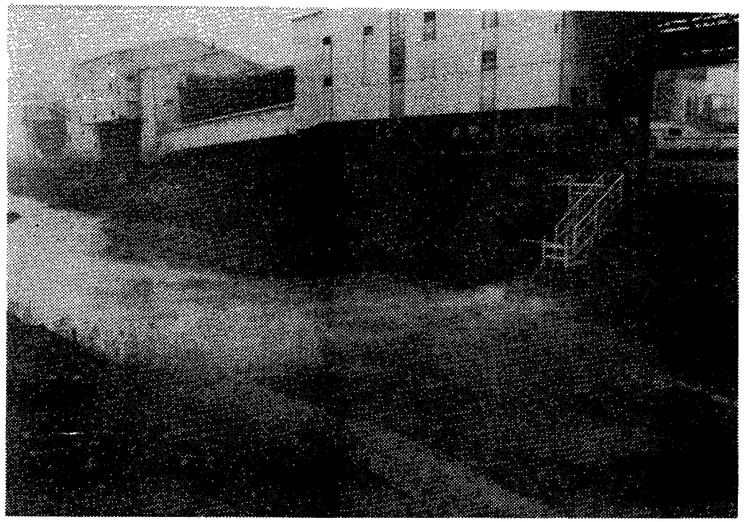
Waste Load Allocation Study

Once water quality standards are issued for a waterway, the state must answer a practical question, "How much of each pollutant should each facility be allowed to discharge to the stream so that standards will not be violated in the stream as a whole?" This "waste load allocation" can be done with methods ranging from simple mathematical formulas to complicated computer models.

The State of Indiana is now conducting, through an outside contractor, a waste load allocation study on the Grand Calumet River and Indiana Harbor Canal. The results can be a valuable tool, used to: determine existing water quality; identify the levels of water quality that could be achieved using stricter methods of pollution control; decide if it is possible or necessary to change water quality standards; and to predict whether or not additional controls may be needed to meet existing water quality standards. Such a study involves taking water samples; reviewing existing data; and using a computer model to predict the impact of a variety of regulatory changes.

Two direct outcomes of the study could be: 1) assessment of permit limits for some dischargers (including all three sanitary districts) and 2) the review and possible revision of water quality standards for the river and canal. The NPDES permits for the three sanitary districts are slated for reissuance when the waste load allocation provides new information about how much improvement is possible, and what would be necessary so that standards in the river are met.

This particular waste load allocation study examines few toxics beyond heavy metals; the focus has been placed on conventional pollutants. The Federation is disappointed that the sampling strategy does not include even the "priority pollutants" that are known to be discharged, such as benzene, naphthlane and other organics. However, when the new permits are issued, and the water quality standards reviewed, there will be opportunity for public comment.



A Toxic Hot Spot

Under a 1976 consent decree signed by EPA and several environmental groups, EPA was required to identify sites where, even after effluent standards required by law were met, water would still not be protected from toxic contamination. When EPA first compiled this list, the Indiana Harbor Canal was included; but EPA has failed to act on this listing, beyond collecting data.

Now, two new proposals to ammend the Clean Water Act may finally force EPA to act on Toxic Hot Spots. Bills introduced in both the Senate and in the House have outlined a plan that EPA, together with the states, must follow to identify hot spots, come up with a strategy for action, and implement stricter controls for toxics, within approximately a five-year period. If this legislation passes during reauthorization of the Act, there is a good chance the Indiana Harbor Canal and the Grand Calumet River would qualify for action. Action, in this case, means that the State could require more stringent controls beyond the current technology-based effluent limits required of polluters, in order to reduce the input of toxic pollutants to the river.

Dredging the Harbor and Canal

Periodically, the Army Corps of Engineers has dredged the Indiana Harbor and Canal to a navigable depth to enable materials and products to be shipped to and from the industries that line the canal. In the past, these dredged sediments were dumped in the open waters of Lake Michigan, but new laws have placed tight restrictions on the disposal of polluted sediments in open lake waters. EPA has developed guidelines for classifying sediments, guidelines which must be followed when determining disposal options.

Because the sediments from the Indiana Harbor Canal are heavily polluted with oil, grease, metals and organic chemicals, they must be contained in what is called a "confined disposal facility" which would be constructed by the Corps of Engineers, and designed to minimize leakage of the contaminated sediments into the surrounding environment.

The Chicago District of the Corps has begun the complicated process required to complete the dredging operation. The first step is acquiring a sponsor (e.g., a local government body), which must pay 25 percent of the construction costs, and eventually assume liability after construction is complete. Lake County has agreed to sponsor the project, and has endorsed one of four sites presented in a feasibility study completed by the Corps. The site preferred by Lake County is in Lake Michigan, off Jeorse Park in East Chicago. This action will create an artificial island near the shore, which may eventually be covered and developed into a park or marina. The proposal has met with opposition from private citizens, as well as groups like the United Steelworkers of America, Local 1010 and the Lake Michigan Federation, who are concerned that the lake could be adversely affected if the confined disposal facility leaks. The Lake Michigan Federation submitted comments to the Corps objecting to the recommended lake site, and pointing out other potential problems, such as the discharge of treated leachate to the Grand Calumet River, and the dredging process itself, which could resuspend toxics now dormant in the sediments.

Before the Corps can proceed it must publish an Environmental Impact Statement (EIS) that explores the potential effects of the dredging and the facility on the ecosystem. Social and economic considerations will also be included; and impacts will be evaluated for all four possible sites, including the three not chosen by the Lake County Board of Commissioners. This expanded scope has been undertaken partly in anticipation of further opposition to the lake site by the public and by other agencies which must review the EIS. After the EIS is issued in final form, the Corps must obtain necessary permits before the actual dredging can begin. If all goes smoothly, the dredging itself could begin in late 1986. However, given the many bureaucratic opportunities for delay, adherence to this schedule seems unlikely.

Improvement Strategies

How Can the River Be Reclaimed?

If all existing regulations and programs on the Grand Calumet River system were implemented and enforced on a reasonable schedule, water quality would steadily improve--to a point. In its 1983 Report on Great Lakes Water Quality, the International Joint Commission was pessimistic about the degree of recovery possible under current remedial action..."...it is doubtful whether the environmental problems will be completely resolved and uses restored." Clearly, only an extraordinary efort can revitalize the Grand Calumet River and the Indiana Harbor Canal. All of the suggestions offered below are currently available under either federal or state law. Some of the actions would require major policy shifts--but perhaps this is the only kind of action that can solve the problems of this river system.

1. THE IMPACT OF THE INDIANA HARBOR CANAL ON LAKE MICHIGAN MUST BE QUANTIFIED. The IJC's 1983 update points to the fact that no studies are proposed to determine the effect of the system on Lake Michigan. Two major areas of concern are the effects of toxics on the lake, and the fate of polluted sediments dispersed from the canal.

2. THE STATE OF INDIANA SHOULD UPGRADE THE USE DESIGNATION OF THE RIVER, and develop stricter water quality standards that reflect the river's tributary status and include numerical limits for priority pollutants that are discharged to the river.

3. NEW SECOND-ROUND NPDES PERMITS SHOULD INCLUDE NUMERICAL LIMITS FOR TOXICS reported on the 2C application. Permits expire after a five year period. Many permits are now being reviewed and issued for the second time. Whenever authorized by EPA effluent guidelines, limits should be stricter than first-round permits. Backsliding in permits should never be allowed.

4. U.S. EPA MUST ENFORCE REASONABLE COMPLIANCE SCHEDULES FOR PRETREATMENT PROGRAMS AT THE THREE SANITARY DISTRICTS. Many of the problems of the East Chicago and Hammond sewage treatment plants can be traced to the high volume of untreated industrial wastewater. EPA must insure industrial compliance with categorical pretreatment standards.

5. THE STATE OF INDIANA SHOULD ESTABLISH A FIELD OFFICE OF THE DIVISION OF WATER POLLUTION CONTROL IN NORTHWEST INDIANA. Indiana is the only state in EPA, Region V that does not have field offices to enforce environmental laws. This is a serious handicap in terms of monitoring, checking compliance with permits by sampling and inspections, and enforcement. Even the central office in Indianapolis has far fewer staff assigned to these areas than other states in the region.

6. SOURCES OF NONPOINT POLLUTION MUST BE IDENTIFIED AND CONTROLLED --especially landfills that may contain toxic substances. These sites are beginning to be regulated under the Resource Conservation and Recovery Act (RCRA).

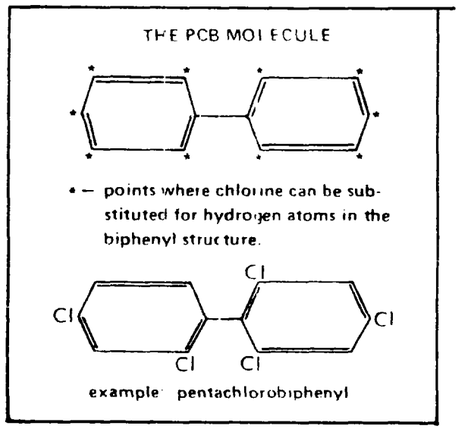
7. EPA MUST CONTINUE AGGRESSIVE ENFORCEMENT ACTION AGAINST THE SANITARY DISTRICTS for noncompliance with the Clean Water Act's Construction Grants Program.

Sediment Analysis: PCBs

Distribution of Polychlorinated Biphenyls (PCBs) in Bottom Sediments of the Grand Calumet River

The intent of this investigation is to analyze bottom sediments from the Grand Calumet River for polychlorinated biphenyls (PCBs) in order to gain an understanding of the distribution of these chemicals. Of the various types of pollutants found in sediments, PCBs have been selected because of their persistence in the environment, bioaccumulation and magnification in the food chain, and toxic properties. (1)

PCBs are industrial chemicals, belonging to the family of chlorinated hydrocarbons. (1) PCBs are formed by the direct chlorination of the biphenyl ring structure as shown below.



There are ten possible sites for chlorine, which can produce 209 possible structures or isomers. (2) Commercial PCBs are mixtures of different isomers with varying chlorine content. Aroclor is the trademark for PCBs in the U.S. Each PCB mixture is given a four-digit number identification. The first two digits, 12, indicate the biphenyl structure. The last two digits specify the weight percent of chlorine. For example, 1254 is 54 percent chlorine and 1260 is 60 percent chlorine. (2) Commercial PCB mixtures are very complex. In Aroclor 1254 alone there are 85 isomers. (2)

The outstanding physical and chemical properties of PCBs have led to numerous uses such as dielectric fluids (capacitors, transformers), industrial fluids (used in hydraulic systems, gas turbines, and vacuum pumps), fire retardants, heat transfer applications, and plasticizers (adhesives, textiles, surface coatings, sealants, printing, copy paper). (3)

PCBs were discovered in 1881. In 1929, industrial uses were found and production began. Monsanto Industrial Chemicals Co. was the sole U.S. manufacturer. PCBs began to be recognized as a problem in 1970. They were prohibited in 1972 for uses in such applications as heat transfer fluids, hydraulic fluids, paint components, adhesive components, in plants that produce food, animal feed or food-packaging materials. (1).

Although the manufacture of PCBs as industrial chemicals has been largely banned in this country, most of the hundreds of thousands of tons that were produced between 1930 and 1977 are still present uncontrolled in the environment. (6) Almost three-fourths of discarded PCBs have ended up in dumping grounds as junked plastics, paints, and primarily, in abandoned capacitors and transformers. The PCBs slowly leak out and can be washed by rain and melted snow into nearby waterways. (1)

In the recent past, rivers, lakes and oceans seemed a suitable place for PCB disposal. Fish take up the PCBs through their gills, fins and skin. PCBs adhere to small particles in the water and are thus taken in by phytoplankton, zooplankton and invertebrates and passed up through the food chain to the top predators, fish and fish-eating birds and mammals.(1) In this process, PCBs bioaccumulate and biomagnify. Some fish contain concentrations of PCBs that are 100,000 to 1,000,000 times greater than the concentrations in surrounding water. (1) In the U.S. the highest concentration of PCBs is in the sediments of the St. Lawrence-North Atlantic drainage basin (includes the Great Lakes), and in the waters of the southeastern coastal states. (1)

PCBs also enter the atmosphere through vaporization and incineration of PCB-impregnated materials. They are then transported by winds and come down in precipitation, in dust particles and as vapor, to contaminate land and waterways. (1,7,8)

PCBs are prevalent in many industrial products with service lives up to 10-20 years or more. As a result, they will continue to be released to the environment as these materials are gradually discarded and decompose. The fact that PCBs are persistent in the environment for long periods of time and are hard to eliminate makes them much more of a threat. (1)

Sediment Analysis: PCBs

The Carcinogen Assessment Group of the US EPA included PCBs on their list of chemicals identified as "having substantial evidence of carcinogenicity." (6) Because of the low solubility of PCBs in water and their high affinity for fatty tissues, it appears that the primary exposure for humans to existing PCBs is through the food chain. Thus, those sediment deposits of PCBs in aquatic environments accessible to fish populations pose the greatest threat to fish-eating birds and mammals, and to human health. High PCB contamination levels have been found both in the tissues of Lake Michigan fish and in bottom sediments of the lake, its harbors and its rivers. (6)

The Grand Calumet River and Canal are highly polluted, evidenced by water quality monitoring data collected by the Indiana State Board of Health, Division of Water Pollution Control. (12,13) The US EPA has identified the Indiana Harbor as one of the most contaminated harbors in the Great Lakes. (14) Sediments from the Indiana Harbor and Canal have high concentrations of toxic constituents: polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), mercury, lead, arsenic, cadmium and other metals. (11)

PCBs enter the river system primarily from direct industrial discharge, air deposition, land and road runoff. Water solubility of PCBs is very low, so they tend to adhere to sediment particles. PCBs do not readily degrade once in the sediment, so they accumulate in the river bottom.

US EPA Region V has suggested guidelines for the regulation of PCBs and other pollutants in Great Lakes harbor sediments. These guidelines were developed under the pressure of the need to make immediate decisions regarding the disposal of dredged material. They have not been adequately related to the impact of the sediments on the lakes and are considered interim guidelines until more scientifically sound guidelines are developed. (15) If the total PCB concentration is equal or greater than 10 mg/kg dry weight (ppm), the sediments are classified as polluted and unacceptable for open lake disposal. The pollutional classification of sediments with total PCB concentrations between 1.0 mg/kg and 10.0 mg/kg dry weight will be determined on a case-by-case basis. (15) The EPA has also set PCB disposal rules in order to implement the Toxic Substances Control Act (TSCA). The level of 50 ppm was set above which sediment must be disposed of in a federally approved landfill or incinerator For the Ontario Ministry of the Environment (MOE) evaluations of dredging projects, guidelines have also been suggested as indicative of contaminated sediments. The guideline for PCBs is 0.05 ppm dry weight, the highest acceptable concentration for open lake disposal. (15)

Even though this study has not investigated PCB concentrations in the water, the Indiana Stream Pollution Control Board has set water quality standards for the river system. The maximum allowable concentration for PCBs in water is 0.001 micrograms/liter (parts per billion). (16)

Six studies have measured the degree of PCB contamination in the sediments of the Grand Calumet River system. These studies include: US EPA in 1977, 1978, 1980-81; Indiana State Board of Health in 1978; United States Geological Service in 1978-79; and the Army Corps of Engineers in 1979. (17-22)

The studies show that PCB concentrations are quite variable over the entire length of the river and canal. The higher values were found in the mid-section of the Indiana Harbor Canal (89.22, 49.21, 33.56 ppm); at the junction of the West Branch of the GCR with the East Branch (83.5 ppm); and the mid-portion of the East Branch of the GCR (68.8 ppm). The only sections that have consistently lower concentrations are the headwater lagoons and the mouth of the Indiana Harbor. Many of the levels found exceed the 10 ppm guideline established by the US EPA.

The above mentioned studies were done to estimate PCB contamination in terms of variation through the system, possible effects on Lake Michigan, and consideration for dredging projects. The studies varied in their sampling sites and methods of sample collection. Statistical analysis was not done except for calculated average values in two of the studies.

In order to improve on these studies and add to the existing data, the following experimental design is proposed for this study:

1) to select sites along only the East Branch of the Grand Calumet River,

2) to collect samples from a boat, because bridge contamination is not always representative of contaminants due to scouring and sorting of sediments (11), and

3) to collect three composite replicate samples along the transect of the river at each of the sites in order to be more representative of PCB contamination and allow for statistical evaluation of differences in PCB concentration within and between sites.

PBC SAMPLING SITES, FLOW DIRECTION
AND COMBINED SEWER OVERFLOW POINTS

7 SAMPLING SITES

DIRECTION OF WATER FLOW

COMBINED SEWER OVERFLOW POINTS

N

0 4000
FEET

LAKE MICHIGAN

Chicago

Wolf Lake

Indianapolis Blvd

Amtrak RR

Whiting

Indiana Harbor Canal

Hammond

Calumet Av

Columbus Dr

East Chicago

Harbor

Indiana Harbor Canal

Amtrak RR

Gary

Chicago Av

South Shore RR

Grand Calumet River

Calumet City

Gary Airport

Burns Ditch

Grand Calumet River

Gary

South Shore RR

5th Av

4th Av

ILLINOIS
INDIANA

Hammond

Calumet Av

Indianapolis Blvd

Kennedy Av

Cline Av

Burr St

Grant St

Broadway

Amtrak RR

Gary

East Gary

Little Calumet River

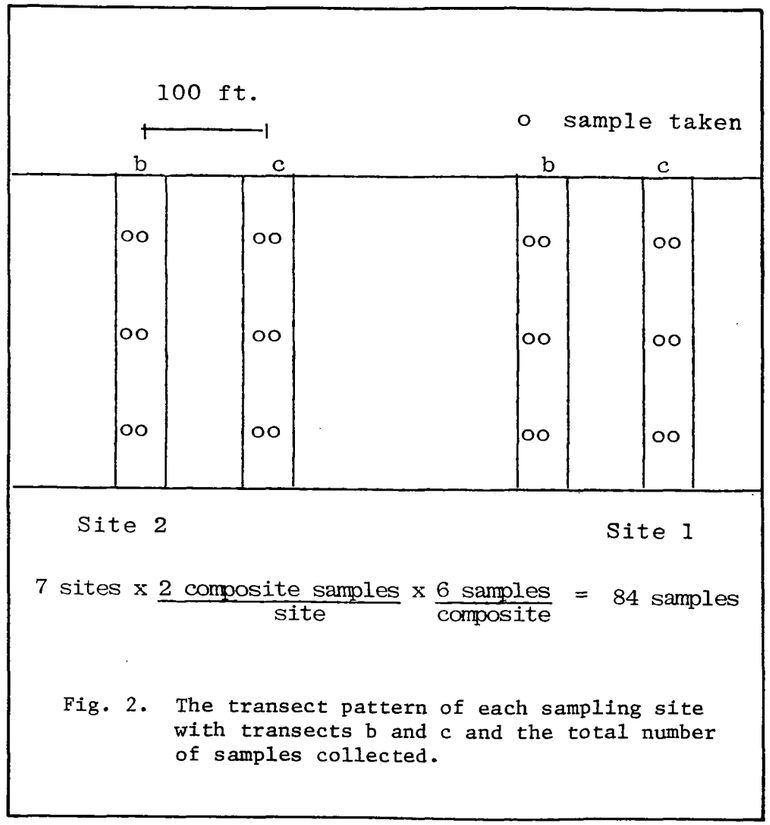
Hammond

Gary

Little Calumet River

Sediment Analysis: PCBs

Sediment samples are collected at seven sites along the East Branch of the Grand Calumet River because access was easier than the rest of the system. Also, the PCB data reflects the environmental impact of the various industries, sewage treatment plant and dumps located along this river branch. These include: US Steel Gary Works, EJ & E Railroad, Gary Metropolitan Sanitary District, Gary Municipal Airport, and Gary Landfill.



$$7 \text{ sites} \times \frac{2 \text{ composite samples}}{\text{site}} \times \frac{6 \text{ samples}}{\text{composite}} = 84 \text{ samples}$$

Fig. 2. The transect pattern of each sampling site with transects b and c and the total number of samples collected.

Each site consists of two transects spaced 100 feet apart, as shown in Figure 2. One composite sample is collected from each transect. Each composite is made up of six samples, two collected at the center of the river basin and two collected at each side midway between the center and edge. Two composite samples result from each site. The total number of bottom sediment samples collected is 84.

Samples are collected with a core sampler attached to piping which is manually pushed down into the sediment, pulled out of the water, and emptied into a pail. The samples are composed of the top 1-2 feet of sediment. This was done repeatedly at each transect of each site. The samples are mixed in the pail and then transferred as a represented sample to a quart glass jar. The core sampler is chosen over a grab sampler in order to collect a more consistent depth sample instead of a surface grab sample. A core sample is also more representative of contamination through time, whereas a surface grab sample reflects only the more recent deposits.

Qualitatively, the sediment is oily, dark and silty, and always has a strong unpleasant odor. It is necessary to protect the skin as much as possible from contact with the sediment. Inhalation of the sediment odor causes headache and overall ill-feeling.

Collection and analysis of the samples are done according to US EPA and Army Corps of Engineers' procedures. (21,23,24,25) After collection, the samples are stored in glass jars under refrigeration until ready to be analyzed. The analysis is done on 21 samples (7 sites times 2 samples per site plus 3 duplicate samples plus 4 spiked samples = 21 samples)

Analysis Methodology for PCB Study

The sediment sample is dried. Extraction of 10 g of the sediment is done with 1:1 hexane/acetone mixture in a flask that is in a shaker water bath set at 37° C for 24 hours. The extract is filtered with a Buchner funnel, run through sodium sulfate and concentrated in a Kuderna-Danish apparatus to approximately 5 ml. The 5 ml extract is then partitioned through a florisil column using petroleum ether for elimination of interferences and separation of various pesticide mixtures. Several florisil cleanups may be necessary. Samples are then treated with activated copper for sulfur removal which is the most common interference encountered with sediment samples. Qualitative and quantitative determination is affected via gas liquid chromatography employing electron capture detection (GC/EC). The concentrations are calculated manually using the peak heights of the major peaks (at least five peaks are used) in that portion of the chromatogram that is free from the interfering peaks of other Aroclors. A method blank, duplicate, and spiked samples are analyzed with each group of ten or fewer samples for quality control purposes.

Total PCB Concentration in Grand Calumet River Sediment at Chosen Sites in mg/kg (ppm) Dry Weight and Wet Weight Amounts

SITE #	mg/kg DRY WEIGHT	mg/kg WET WEIGHT
1b	5.8	7.9
1c	13.4	21.2
2b	9.4	14.6
2c	10.4	18.0
3b	4.5	8.3
3c	6.0	11.3
4b	20.9	31.6
4c	24.3	35.7
5b	3.8	5.3
5c	4.5	8.6
6b	2.1	6.0
6c	3.9	10.2
7b	9.4	16.8
7c	5.1	9.8

TABLE I.

Results and Conclusions

The table at left lists the total PCB concentrations calculated from sediment collected at the sites located on the map on p.24. The concentrations are in mg/kg (ppm) dry weight and wet weight amounts. The dry weight concentrations allow comparisons to the guidelines which are set in dry weight limits. The wet weight concentrations give a more realistic picture of PCBs in the river environment.

The preliminary data is quite variable along the course of the river with several of the samples exceeding the 10 ppm dry weight guideline established by the EPA for polluted sediment. All of the data exceeds the guideline set by the Ontario Ministry of the Environment (MOE) of 0.05 ppm dry weight. The data does not give evidence of "hot-spots," but previous studies have shown they do exist. The sampling collection technique of composite samples might have diluted any "hot-spot" sites.

The data does show that PCBs exist in the Grand Calumet River sediment in significant amounts. There is the potential for migration of the PCB-laden sediment through the Grand Calumet River system and eventually into Lake Michigan. This can occur through the actual physical movement of the sediment along the river bottom with the current.

Resuspension of PCBs also can occur from the sediment to the water column. Since PCBs are largely insoluble in water, they adhere to suspended particles and are then transported through the river system. (26)

Once the PCBs enter into the lake's ecosystem, they are easily bioaccumulated. This occurs as PCBs are passed through the food chain, smaller organisms consumed by larger ones, ultimately reaching the primary carnivores in the lake, the lake trout and salmon. (27)

Efforts are presently being made to clean-up the Grand Calumet River. One of the goals is the improvement of water quality in the system. If water quality does improve, the question to be addressed is what to do with the sediment. The sediment is not only polluted with PCBs but with myriad other pollutants such as heavy metals and polynuclear aromatic hydrocarbons. The sediment is a constant source of pollution of the water column through resuspension. This is a serious problem, especially if aquatic life is reintroduced into the river.

Except for previously identified "hot-spots," the PCB data shows concentrations below the 50 ppm dry weight limit set by the Toxic Substances Control Act (TSCA), above which the sediment would have to be dredged. It is unlikely that the sediment would be dredged from the river--to remove it would be a monumental task. The whole process of dredging and disposal of dredged materials causes a resuspension of these materials into the water and an increase in bioavailability of associated contaminants into the food chain. (28)

One possible solution to detoxify the sediment in the river is through PCB-degrading bacteria. Success has been shown in experiments done at General Electric, and continued studies are underway to more fully understand the degradation process. (29)

There are other methods of PCB removal and/or destruction being investigated, chemical, physical and biological, with very limited applicability to sediment in situ. Hopefully, further studies will produce more options in dealing with contaminated sediments of river systems.

FOR REFERENCE listing, see the Appendix.

Natural Areas

Introduction

Although it has the image of an "urban river," the Grand Calumet boasts a surprising number of natural areas within its drainage basin. During the spring and summer of 1982, four of these natural areas were extensively surveyed by Robert Jessup, a graduate student intern for the Lake Michigan Federation.

The four sites within the designated 1/2-mile corridor were selected because each typified a different riverfront habitat, from fresh water marsh, to dune and swale, to sand savanna and prairie. Roxana marsh (in East Chicago's Roxana neighborhood), was a top priority. Although the marsh's reputation as a notable wetland and popular birding area was common knowledge, little had been done to document the bird species observed there. The other three sites were: an area known as the Ivanhoe dune and swale, south of the river in Gary; a large marsh and prairie area east of duPont north of the river (this tract was divided into two smaller study areas); and finally, a dune and swale habitat northeast of the Gary sewage treatment plant, north of the river. Two of these sites had been inventoried years ago under the Coastal Zone Management program, but no recent data was available.

The purpose of the surveys was to prove that these areas supported a diverse wildlife population. The results add more evidence to the argument that the Grand Calumet has potential for revitalization, and that even riverfront habitats affected by human uses still can be notable enough to be protected from further degradation or destruction. Another goal was to gather supporting data that could be used during public comment periods to prevent filling of wetlands or discharge of pollutants that would harm these habitats. Inventories like this one are also invaluable to organizations such as the Nature Conservancy in assessing the possibility of purchasing land to protect it.

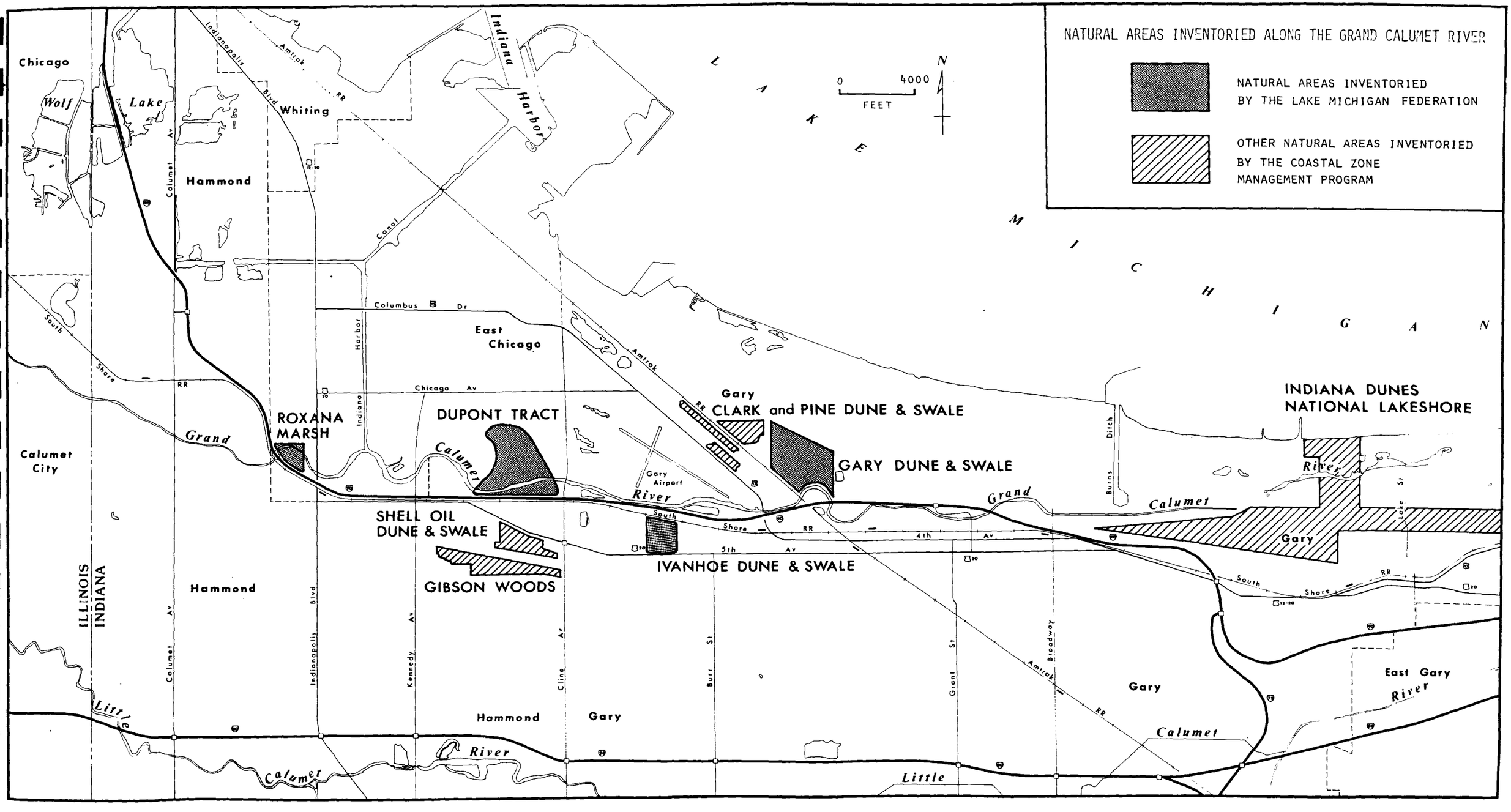
The inventories began in March, 1982 and continued through the summer. Because an application for a permit to landfill Roxana marsh was being reviewed during that period by the Army Corps of Engineers, inventories at that site were conducted first. Each area was visited up to six times to record flora and fauna. Water samples were taken at these sites to evaluate parameters such as coliform bacteria (its presence indicates that other disease-causing bacteria are in the water), pH, ammonia and nitrate levels, and temperature. All water quality tests, except the coliform test, were completed in the field.

To obtain as accurate an inventory as possible, a similar study pattern was followed at each site. The intern began at 8 a.m. by traversing the area in connected S's for several hours until the entire area was covered. At the end of a four-hour period, he sometimes returned to give a small area special attention. The time of subsequent visits to a given site was rotated to observe species that were only active during certain times of the day. Information gathered during the inventory was recorded at the site, and whenever possible was documented by photography.

The results of this natural areas inventory may inspire a more thorough and extended study that encompasses all four seasons and includes other areas that were eliminated by time and budget constraints. For example, parts of the Grand Calumet basin are known as a bird migration corridor; an Autumn inventory would be an integral part of a more comprehensive study.

Detailed information about the habitats along the Grand Calumet River is crucial to the careful riverfront planning that should accompany improvements in water quality. As we saw in the earlier Water Quality section, data gathered about Roxana marsh helped document the value of the area as a wetland, and provided the Corps and EPA with the tools to evaluate and deny a permit application.

This inventory is a natural bridge to the next section, which will expand the report's purview to encompass land use as well as water quality issues. The ideas that will be put forth for riverfront revitalization are designed, not to disrupt valuable natural areas, but to recognize the compatibility between preservation and beneficial human uses. Intimate knowledge of these remaining natural areas will be the best insurance that there can be harmonious coexistence between nature and humans.


NATURAL AREAS INVENTORIED ALONG THE GRAND CALUMET RIVER
NATURAL AREAS INVENTORIED BY THE LAKE MICHIGAN FEDERATION
OTHER NATURAL AREAS INVENTORIED BY THE COASTAL ZONE MANAGEMENT PROGRAM
0 4000 FEET
N
LAKE MICHIGAN
Chicago
Wolf Lake
Hammond
Whiting
Indiana Harbor
East Chicago
Gary
Calumet City
ROXANA MARSH
DUPONT TRACT
CLARK and PINE DUNE & SWALE
GARY DUNE & SWALE
SHELL OIL DUNE & SWALE
GIBSON WOODS
IVANHOE DUNE & SWALE
INDIANA DUNES NATIONAL LAKESHORE
ILLINOIS
INDIANA
Grand Calumet River
Little Calumet River
Indianapolis Blvd
Columbus Dr
Chicago Av
5th Av
4th Av
Gary Airport
Amtrak RR
South Shore RR
Canal
Harbor
Ditch
Lake St
East Gary

Natural Areas

Roxana Marsh

This wetland area lies in East Chicago's Roxana neighborhood, just south of the Grand Calumet between Indianapolis Blvd. on the east and the Hammond sewage treatment plant on the west. The marsh, which is part of the natural floodplain of the river, is bordered on the south by Roxana Drive.

The habitat can be described as a fresh water marsh, and is less than one foot deep in most places, although scattered pools may be as deep as four feet. Cattails (Typha latifolia), the primary shoreline vegetation, are dense in several places and provide excellent cover for wildlife. Rushes (Juncus spp.), Sedge (Carex spp.) and reeds also dominate the area. Whether or not the mudflats in the marsh are seasonal, (i.e., submerged during periods of heavy rain), can only be determined by continued observation.

Fresh water marshes are major duck breeding areas. Birds typically found in this habitat include: Mallards, teals, Canada Geese, herons, plovers, sandpipers, marsh hawks, coots and rails. Marshes are also habitat for frogs, toads, salamanders, newts and turtles. Typical mammals include muskrats, beavers, mink, raccoons and voles. In the marsh itself, carp, green sunfish and gambusia (mosquito fish) are commonly found. A list of species actually observed at Roxana marsh is included in this report.

Of course, the poor water quality in the Grand Calumet River, which feeds the marsh, has an impact on the fish species present. However, water quality samples taken during site visits indicate that heavy metals are absent, and that water is clear and odor-free at least part of the time. (This may be caused by the contribution of underground freshwater springs.) Direction and flow at the marsh varied during the period of observations, and may be affected by factors such as rain, wind or volume of discharges from the Hammond sewage treatment plant, which is directly upstream of the marsh. Turbidity (the level of suspended material) varied depending on the direction of flow.

Areas just east of Roxana marsh along the Grand Calumet have gone through succession and are now cattail marshes. In the opinion of the intern who conducted this inventory, Roxana marsh will have to be dredged if its character as an open water marsh is to be preserved.

SPECIES LIST FOR ROXANA MARSH

AMPHIBIANS	
American Toad	Bufo americanus
Northern Leopard Frog	Rana pipiens
Chorus Frog	Pseudacris triseriata
REPTILES	
Snapping Turtle	Chelydra serpentina
Painted Turtle	Chrysemys picta
FISH	
Carp	Cyprinus carpio
MAMMALS	
Muskrat	Ondatra zibethicus
Eastern Raccoon	Procyon lotor
Mink	Mustela vison
BIRDS	
Green Heron	Butorides striatus
Mallard	Anas platyrhynchos
Blue-winged Teal	Anas discors
Greater Scaup	Aythya marila
American Kestrel	Falco sparverius
Common Gallinule	Gallinula chloropus
American Coot	Fulica americana
Killdeer	Charadrius vociferus
Lesser Yellowlegs	Tringa flavipes
Wilson's Phalarope	Steganopus tricolor
Semipalmated Sandpiper	Calidris pusilla
Baird's Sandpiper	Calidris bairdii
Pectoral Sandpiper	Calidris melanotos
Dunlin	Calidris alpina
Herring Gull	Larus argentatus
Black Tern	Chlidonias niger
Common Nighthawk	Chordeiles minor
Blue Jay	Cyanocitta cristata
Red-winged Blackbird	Agelaius phoeniceus
Common Grackle	Quiscalus quiscula
Northern Junco	Junco hyemalis
Field Sparrow	Spizella pusilla
Song Sparrow	Melospiza melodia

Natural Areas

SPECIES LIST
FOR GARY DUNE AND SWALE

AMPHIBIANS	
Chorus Frog	Pseudacris triseriata
REPTILES	
Painted Turtle	Chrysemys picta
Eastern Hognose Snake	Heterodon platyrhinos
Plains Garter Snake	Thamnophis radix
Massasauga	Sistrurus catenatus
FISH	
Carp	Cyprinus carpio
Green Sunfish	Lepomis cyanellus
MAMMALS	
Franklin's Ground Squirrel	Spermophilus franklinii
Red Fox	Vulpes vulpes
Mink	Mustela vison
BIRDS	
Great Blue Heron	Ardea herodias
Green Heron	Butorides striatus
Least Bittern	Ixobrychus exilis
Mallard	Anas platyrhynchos
Blue-winged Teal	Anas discors
Red-shouldered Hawk	Buteo lineatus
Killdeer	Charadrius vociferus
Belted Kingfisher	Megaceryle alcyon
Common Flicker	Colaptes auratus
Red-headed Woodpecker	Melanerpes erythrocephalus
Bank Swallow	Riparia riparia
Barn Swallow	Hirundo rustica
Cliff Swallow	Petrochelidon pyrrhonota
Blue Jay	Cyanocitta cristata
Marsh Wren	Cistothorus palustris
Northern Mockingbird	Mimus polyglottos
Gray Catbird	Dumetella carolinensis
American Robin	Turdus migratorius
Yellow Warbler	Dendroica petechia
Red-winged Blackbird	Agelaius phoeniceus
Common Grackle	Quiscalus quiscula
American Goldfinch	Carduelis tristis

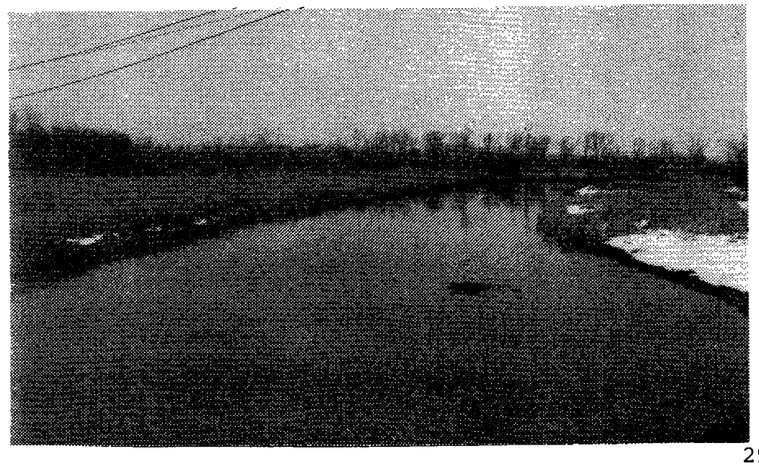
Gary Dune and Swale (Sand Mined Area)

This unnamed site in Gary lies across the river to the north and east of the Gary sewage treatment plant. The site is bordered on the west by Clark St., on the north and southwest by railroad tracks, on the south by the Grand Calumet River and on the east by American Bridge Company. The original landforms and vegetation have been affected in some areas by sandmining operations. The area can be described as "dune and swale," a landform characterized by alternating strips of sand dunes and low, wetland areas. In this case the strips run in an eastwest direction, vestiges of the shoreline of glacial Lake Chicago.

Several distinct habitats exist within this dune and swale community--savannas are the most common. Mesic and xeric prairie conditions exist, as well as ponds and marshes. Many plant species that typify a dune and swale community were observed at this site, including: oak, dogwood, prickly-pear cactus, wild strawberry, sedges, reeds and cattails.

Because a dune and swale community is comprised of different habitats, it is difficult to establish a list of "typical" animal species present. Species commonly found in each distinct habitat within the community as a whole may often be found in the adjacent, overlapping habitat. The animal species observed at this particular dune and swale are listed separately in this report.

In 1982, the Fish and Wildlife Service conducted an extensive inventory of this area in order to respond to a request for technical assistance from the Gary Sanitary District. A letter to the District, which was considering using the site for a sludge landfill, is included in our Appendix.



Natural Areas

Ivanhoe Dune and Swale

This small dune and swale community is located on the south side of the Grand Calumet, sandwiched between the tollway on the north, and Route 20 on the south. A small oasis of life in the midst of developed industrial and residential tracts, the Ivanhoe dune and swale was part of the 1978 Coastal Zone Management natural areas inventory. According to that inventory, the site is: "An interesting mixture of wooded ridge and swamp-marsh....(It) supports one of the best woodcock populations ...in northern Indiana..... Undoubtedly many more birds will be found here, especially woodland and marsh birds." (1)

Upon visiting the site, the Federation's intern discovered a healthy, diverse population of flora, including species typical of a dune and swale community. Alternating with the dune ridges, which shelter isolated patches of prickly-pear cactus, several oblong marshes run parallel to the Grand Calumet. Cattails, sedges, and willows dominate the edges of the marshes. A complete list of animal species observed at this site follows.

1. (An Inventory of Natural Areas in the Indiana Coastal Zone Study Area, Technical Report No. 302, p. 63, Indiana Dept. of Natural Resources and Natural Land Institute. 1979.)

SPECIES LIST
FOR IVANHOE DUNE AND SWALE

AMPHIBIANS	
Chorus Frog	Pseudacris triseriata
MAMMALS	
Eastern Cottontail	Sylvilagus floridanus
Plains Pocket Gopher	Geomys bursarius
Eastern Raccoon	Procyon lotor
BIRDS	
Red-tailed Hawk	Buteo jamaicensis
Mourning Dove	Zenaida macroura
Yellow-billed Cuckoo	Coccyzus americanus
Common Screech Owl	Otus asio
Common Nighthawk	Chordeiles minor
Chimney Swift	Chaetura pelagica
Common Flicker	Colaptes auratus
Yellow-bellied Sapsucker	Sphyrapicus varius
Downy Woodpecker	Picoides pubescens
Least Flycatcher	Empidonax minimus
Blue Jay	Cyanocitta cristata
American Crow	Corvus brachyrhynchos
Gray Catbird	Dumetella carolinensis
Brown Thrasher	Toxostoma rufum
Golden-winged Warbler	Vermivora chrysoptera
Yellow Warbler	Dendroica petechia
Common Grackle	Quiscalus quiscula
Rufous-sided Towhee	Pipilo erythopthalmus

duPont Tract

The duPont tract lies just north of the Grand Calumet in East Chicago. Owned by E. I. duPont deNemours & Company, the site is bordered by the duPont plant on the west, Cline Avenue on the east, the Grand Calumet on the south, and railroad tracks on the north. Because this area is so large and diverse, it was divided into two distinct portions for the purpose of this inventory: the riverfront habitats and the area farther inland.

duPont: Inland

The inland portion of the duPont tract is itself diverse, including sand savanna (with mesic and xeric prairie conditions) cattail marshes, sedge meadows and ponds. Along the northernmost end of the area, cattail marshes dominate, until they reach the open water of a large pond on the south. In the pond itself, the cattails are replaced by giant reeds (Phragmites communis).

Other smaller ponds lie to the southwest of this main pond, each surrounded by steep banks. As with the larger pond, water quality is poor, and a visual spot check of the water confirmed only a few signs of life. The far southwest corner of the natural area is shared by two habitats, a flooded woodland near the river, and just north of it, a thicket of giant reeds.

A large section of the duPont tract, in the central and eastern portion, is sand savanna, a sparsely wooded community with prairie plants as ground cover. Here the predominant species are black oak and white oak.

SPECIES LIST
FOR DuPONT (INLAND)

AMPHIBIANS	
Chorus Frog	*Pseudacris triseriata*
REPTILES	
Painted Turtle	*Chrysemys picta*
MAMMALS	
Deer	*Odocileus virginianus* (tracks only)
Muskrat	*Ondatra zibethica* (tracks only)
BIRDS	
American Coot	*Fulica americana*
Mallard	*Anas platyrhynchos*
Wood Duck	*Aix sponsa*
Blue-winged Teal	*Anas discors*
Pintail	*Anas acuta*
Goldeneye	*Bucephala clangula*
Oldsquaw	*Clangula hyemalis*
Horned Grebe	*Colymbus auritus*
Common Snipe	*Capella gallinago*
Long-billed Dowitcher	*Limnodromus scolopaceus*
Killdeer	*Charadrius vociferus*
American Crow	*Corvus brachyrhynchos*
Common Flicker	*Colaptes auratus*
Brown Thrasher	*Toxastoma rufum*
Rufous-sided Towhee	*Pipilo erythropthalmus*

duPont: Riverfront

Both the north and south banks of the Grand Calumet River near duPont were inventoried. During numerous site visits to this part of the river, it was observed that the water was teeming with carp that had swum upstream to spawn. Their presence underscores the progress this river has made--many years elapsed when no fish were seen in the Grand Calumet at all.

On the north side of the river, the flooded woodland mentioned earlier extends all the way to the shore, but is interspersed with arrowheads. As one travels eastward on the north bank, cattails take over, bordered on the north by mesic prairie and a sedge meadow.

On the south bank of the Grand Calumet, which is composed of pumice and boulders, an oak wood community gradually gives way to mesic prairie as the river flows west. Along the riverfront, the unique blend of forest, prairie and marsh harbors an integrated wildlife population that represents each habitat. Animals typically spotted along a river include: herons, turtles, bull frogs, kingfishers, water snakes, otters and muskrats. A list of species sighted along the duPont area riverfront and farther inland is included in this report.

SPECIES LIST
FOR DuPONT (RIVERFRONT)

AMPHIBIANS	
American Frog	*Bufo americanus*
Chorus Frog	*Pseudacris triseriata*
REPTILES	
Snapping Turtle	*Chelydra serpentina*
FISH	
Carp	*Cyprinus carpio*
MAMMALS	
Virginia Opossum	*Didelphis virginiana*
Muskrat	*Ondatra zibethicus*
Eastern Raccoon	*Procyon lotor*
BIRDS	
Mallard	*Anas platyrhynchos*
Blue-winged Teal	*Anas discors*
Red-tailed Hawk	*Buteo jamaicensis*
Ring-necked Pheasant	*Phasianus colchicus*
Common Gallinule	*Gallinula chloropus*
American Coot	*Fulica americana*
Bank Swallow	*Riparia riparia*
Cliff Swallow	*Petrochelidon pyrrhonota*
Red-winged Blackbird	*Agelaius phoeniceus*

Census Data

MEDIAN VALUE OF HOMES BORDERING
THE GRAND CALUMET RIVER BY CENSUS TRACT

(Ranked Highest to Lowest)

Census Tract	Median Value	Census Tract	Median Value
	$		$
101	45,200	203	32,000
102	28,100	204	30,800
103	23,500	205	26,400
104	27,300	206	21,500
105	24,100	208	25,400
106	28,800	210	40,900
107	17,600	304	26,300
108	19,000	306	37,600
109	18,800	307	36,700

The median value clusters tell the region's story from an economic point of view. The census tracts with the three lowest median housing values were all located in the Downtown Gary area.

Three statistical categories from U.S. census data have a significant impact upon any study of redevelopment along the Grand Calumet. These are: population density, age breakdown, and housing value. The population density of a particular census tract indicates areas where demand for recreational, cultural and commercial development along the riverfront would be greatest. Age breakdown is important because different age groups have differing use patterns. For instance, the more elderly the population is, the less important planning for additional playlot space would be. The third variable considered relevant in this discussion is the median value of houses, an indicator of the relative wealth of the neighborhood's real estate.

AGE BREAKDOWN OF POPULATION IN CENSUS TRACTS BORDERING THE GRAND CALUMET RIVER

CENSUS TRACTS	Age in Years 0-14	Age in Years 15-64	Age in Years 65 and up
101	26 %	67 %	6 %
102	30 %	61 %	7 %
103	32 %	64 %	4 %
104	30 %	64 %	5 %
105	32 %	65 %	2 %
106	31 %	65 %	4 %
107	32 %	58 %	10 %
108	27 %	65 %	8 %
109	35 %	61 %	3 %
203	23 %	63 %	12 %
204	26 %	64 %	10 %
205	31 %	62 %	7 %
206	30 %	57 %	13 %
210	23 %	70 %	7 %
303	31 %	59 %	10 %
304	26 %	60 %	13 %
306	15 %	73 %	12 %
307	24 %	66 %	10 %

The age figures are divided into three categories for the sake of comparison: 0-14 (young); 15-64 (working age); 65 and over (elderly). The vast majority of people fall into the 15-64 category, and youths form a greater percentage of their respective census tracts than elderly.

Because of industrial uses which dominate the area north of the Grand Calumet, there is a proportionately large concentration of people south of the river, stretching through Roxana in East Chicago, Hessville in Hammond and Brunswick-West Side in Gary. These communities, represented roughly by census tracts 306, 210, 103, and 303, have a population of 33,860, or approximately one-third of the Calumet region's total population. Census tract 102, which covers the entire north bank of the river through Gary and is more than double the size of the other four riverfront census tracts combined, has a population of only 8,241. This is because census tract 102 contains all of the U.S. Steel complex while tracts 306, 210, and 303 are all residential neighborhoods.

The eighteen census tracts along the Grand Calumet have a total population of 102,100 or 35 percent of the total population of the three cities (288,545).

POPULATION BREAKDOWN

Census Tract	under 4,000	between 4,000 & 5,000	over 5,000
101			6,049
102			8,241
103			12,966
104		4,487	
105	3,835		
106		4,742	
107	3,672		
108	1,471		
109		4,165	
203		4,385	
204		4,638	
205			5,506
206	2,646		
208	3,393		
209	3,877		
210			10,314
303			5,355
304		4,066	
306			5,225
307	3,214		

POPULATION DATA, MEDIAN HOME VALUE
AND MEDIAN INCOME BY CENSUS TRACT

POPULATION AGES
65 AND UP
0-14
15-64

$ 000 median value of homes
$ 000 median income

CENSUS TRACT BOUNDARY AND NUMBER

206

Roxana — NEIGHBORHOOD BOUNDARY AND NAME

0 4000 FEET

N

LAKE MICHIGAN

Chicago
Wolf Lake
Indianapolis Blvd
Amtrak RR
Indiana Harbor Canal
Whiting
Calumet Av
Hammond
North Hammond
$ 26,300
$ 15,600
$ 23,700
$ 9,000
$ 32,000
$ 16,300
Columbus Dr
East Chicago
Harbor
South Shore RR
Calumet Chicago Av
203
$ 30,800
$ 16,600
South Side
204
304
303
$ 36,700
$ 18,200
Grand Calumet River
307
Gary
102
$ 28,100
$ 18,400
$ 17,600
$ 15,200
$ 19,000
$ 9,100
$ 45,200
$ 25,900
Ambridge-Mann
$ 28,800
$ 20,700
Gary Airport
Burns Ditch
Calumet City
206
205
306
$ 21,500
$ 9,400
Central Hammond
Roxana
$ 26,400
$ 16,600
$ 37,600
$ 20,000
$ 40,900
$ 25,000
Grand Calumet River
107
Miller
101
5th Av
4th Av
108
105
106
Brunswick
$ 23,500
$ 19,400
ILLINOIS
INDIANA
Hammond
Woodmar
Indianapolis Blvd
Kennedy Av
210
Hessville
104
103
$ 24,100
$ 18,200
$ 27,300
$ 17,400
Downtown West
Downtown East
109
$ 18,800
$ 17,700
Broadway
Grant St
Burr St
Clinton St
Amtrak RR
Gary
Hammond
East Gary
Little Calumet River
Grand Calumet River

Neighborhoods/ Parks

Neighborhoods in the River Corridor

Five different neighborhoods in Gary lie partially within the river corridor. From east to west they are: Miller, Downtown East, Downtown West, Ambridge-Mann, and Brunswick. Because Gary has so many parks (although many are very small), they are listed here by neighborhood for better organization and clarity.

Miller: Miller is on the northwestern edge of Gary, bounded on the north by Lake Michigan, on the west by a southerly extension of the U.S. Steel 1967 landfill, on the south by the B & O Railroad to Lake St. and then the Wabash Railroad, and on the east by the Lake County line. Of Miller's ten parks, three are in the Grand Calumet corridor and total 275 acres.

Downtown East: Downtown East is bounded on the north by the South Shore and South Bend railroads, on the west by Broadway, on the south by the Penn Central Railroad, and on the east by Colorado St. and the Indiana Toll Road. Five parks in this neighborhood total 18.83 acres, and the four within the southern part of the mile corridor equal 17.39 acres.

Downtown West: Downtown West is bounded on the north by the Grand Calumet River, on the west by Grant St., on the south by 9th Av. and on the east by Broadway. Four of the six parks in Downtown West are within the southern half-mile corridor. Because the other two areas (Jefferson Elementary School and Borman Park) are only two blocks outside of our study area, they deserve description.

Ambridge-Mann: This neighborhood is bounded on the north by the Grand Calumet River, on the west by the Elgin, Joliet, & Eastern Railroad tracks and Chase St., on the south by the Indiana Harbor Belt Railroad, and on the east by Grant St. This area includes census tracts 105 and 106, and five of its six parks are within the southern half-mile corridor of the Grand Calumet.

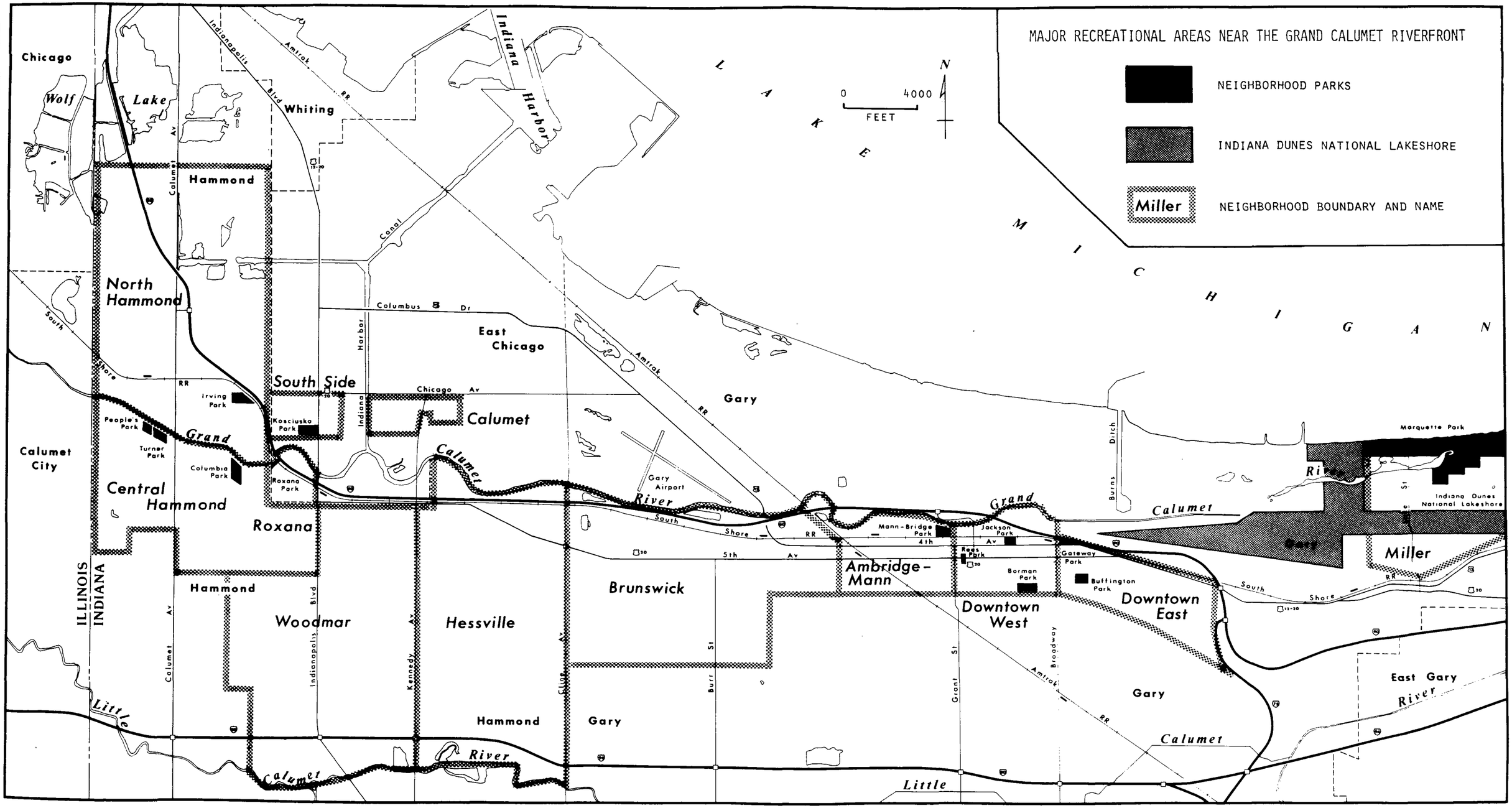
Brunswick: Brunswick is the westernmost neighborhood, bounded on the north by the Grand Calumet, on the west by Cline Av., on the south by 21st Av., and on the east by Clark Rd. up to 9th Av., and then by Chase St. up to the Elgin, Joliet, & Eastern Railroad tracks. Two of Brunswick's parks (totalling 20.6 acres) are in the river corridor.

Park Facilities

Within a one-mile wide corridor along the Grand Calumet River in northwest Indiana, thirty community parks and public school playgrounds make up approximately five-percent of total land use. Within its city limits, Hammond has thirty-three parks, totalling 942.1 acres. However, 279.4 acres of this recreational space are ballfields and playlots adjacent to public schools. Five community parks and four school parks lie within the one-mile river corridor. Total acreage of these nine sites is about sixty acres, approximately six-percent of Hammond's total recreational space.

The city of East Chicago offers 200 acres of recreational space which is divided among 25 community parks. The Grand Calumet flows through East Chicago's attractive Roxana neighborhood, where the river is bordered by Roxana Pond and marsh. In East Chicago, only two public parks, Roxana Park and Kosciuszko Park, lie within the designated river corridor. However, because Kosciuszko Park has more than twenty acres, these two parks account for about ten percent of the city's park space. The city of Gary has sixty-one parks and forty-four public schools, which have a combined recreational space of more than 1,200 acres. Compared to the other two communities along the Grand Calumet, Gary has a large portion (29 percent) of its recreational and open space near the river.

On pages A-16 and A-17 of the Appendix are tables detailing the part facilities mentioned above.


MAJOR RECREATIONAL AREAS NEAR THE GRAND CALUMET RIVERFRONT
NEIGHBORHOOD PARKS
INDIANA DUNES NATIONAL LAKESHORE
Miller
NEIGHBORHOOD BOUNDARY AND NAME
N
0
4000
FEET
LAKE MICHIGAN
Chicago
Wolf Lake
Indianapolis Blvd
Whiting
Amtrak RR
Indiana Harbor
Columbus Av
Hammond
Canal
North Hammond
South Shore RR
Columbus Dr
East Chicago
Harbor
South Side
Irving Park
Chicago Av
Kosciusko Park
Indiana
Calumet
Amtrak RR
Gary
People's Park
Turner Park
Columbia Park
Grand Calumet River
Roxana Park
Gary Airport
Marquette Park
Indiana Dunes National Lakeshore
Calumet City
Central Hammond
Roxana
Burns Ditch
Grand Calumet River
South Shore RR
Mann-Bridge Park
Jackson Park
4th Av
Rees Park
Gateway Park
Buffington Park
Borman Park
5th Av
Ambridge-Mann
Brunswick
Downtown West
Downtown East
Miller
ILLINOIS
INDIANA
Hammond
Woodmar
Hessville
Calumet Av
Indianapolis Blvd
Kennedy Av
Cline Av
Burr St
Grant St
Broadway
Amtrak RR
Gary
East Gary
Little Calumet River
Hammond
Gary
Little Calumet River

Development Opportunities

Gary: Downtown East

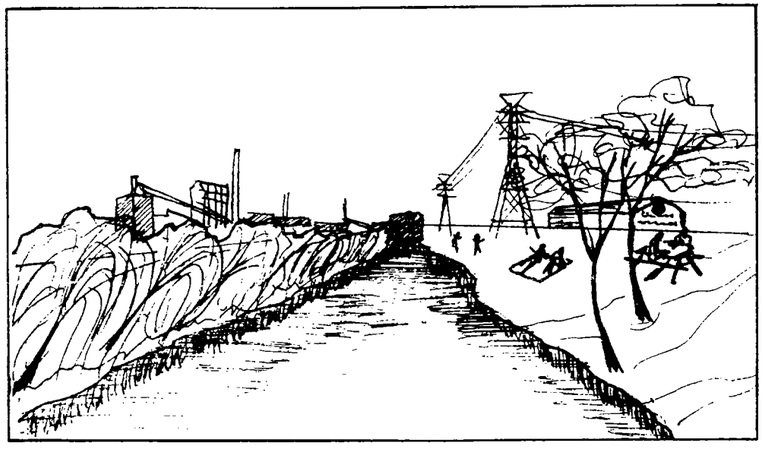
The first opportunity for public access west of the river's headwaters is at the Tennessee St. bridge in Gary, within the Gate City industrial center. This bridge is flanked at its northern end by two outfalls whose effluent makes a moderate contribution to the river's already brisk flow. Here, the Grand Calumet appears to be approximately one-foot deep and its surface is slicked with the telltale rainbow colors of oily wastes. Cooling water effluent from outfalls upstream warms the water enough to emit steam on a cold winter day; perhaps it is this same warmth that contributes to the growth of filamentous algae waving in the current.

East of the Tennessee St. bridge, the south bank of the river is a gradually sloping grassy area punctuated by four high tension towers and crowned by a railroad siding with coal cars. Only one ailanthus tree dots the water's edge, but the gently rising, 100-foot-wide slope between the river and the tracks seems to be adequate for picnics and passive lunchtime recreation for steelworkers. The view across the river, however, is not rewarding: Several big pipes mounted on pylons run the length of the north bank, while the outwash of a coal-type residue spills over into the water. At the top of the rise is a vast dumping ground for what appears to be piles of sludge or solid waste which steams during the winter.

On the west side of Tennessee street, the north edge of the river is in a more natural state. Here, an overgrown, weedy bank drops down abruptly to the river where a rusty pipe runs along the riverbank. This area is topped off by what appears to be a little-used parking lot. The steep south bank (west of Tennessee) boasts a thicket of young trees. Inland from this strip of dense vegetation is a continuation of the same pattern found east of the bridge--a half-block-wide swath of gently undulating open space with high tension towers and railroad tracks at the top. This open area appears to be a right-of-way shared by both the railroad and the utilities. It seems to be worthwhile to explore the possibilities of negotiating wih those parties for granting a public-use easement here. Furnished with a few picnic tables for food or portable games, and perhaps some simple anchored seating for people who want to read outdoors, talk, or sun themselves on their lunch hour, this area could offer employees probably the only open space amenity within the confines of the entire Gary industrial complex.

Unfortunately, this stretch of the Grand Calumet has poor prospects for recreational navigation because one-quarter mile west of the bridge, a pipe crosses at the surface of the water, and a few feet beyond that, a railroad crossing over the river leaves a clearance of approximately six to eight feet. The best prospect would involve relocating the pipe to allow canoes to navigate through.

Approximately three-quarters of a mile west of Tennessee St. is Virginia St., the next bridge crossing the Grand Calumet. However, this bridge is closed to general public access and is guarded by a station that serves as the entry point to the Gary works of U.S. Steel. Unless the steel company were to change its policy and relinquish its easement rights to the riverfront as a civic open space contribution, neither Virginia St. or Broadway (the next crossover to the west, in downtown Gary) could be considered access points to the Grand Calumet.



INDUSTRY-OWNED GARY

0 1400

FEET

U.S. STEEL
GARY WORKS

U.S. STEEL
NATIONAL TUBE WORKS

U.S. STEEL

BURNS HARBOR

GRAND CALUMET RIVER

CALUMET RIVER

GRAND

GARY ARMOR PLATE

INDIANA TOLLROAD

I-90

Lake St

Cypress

Hamilton

Broadway

Virginia St

Tennessee St

2nd Av

2nd Pl

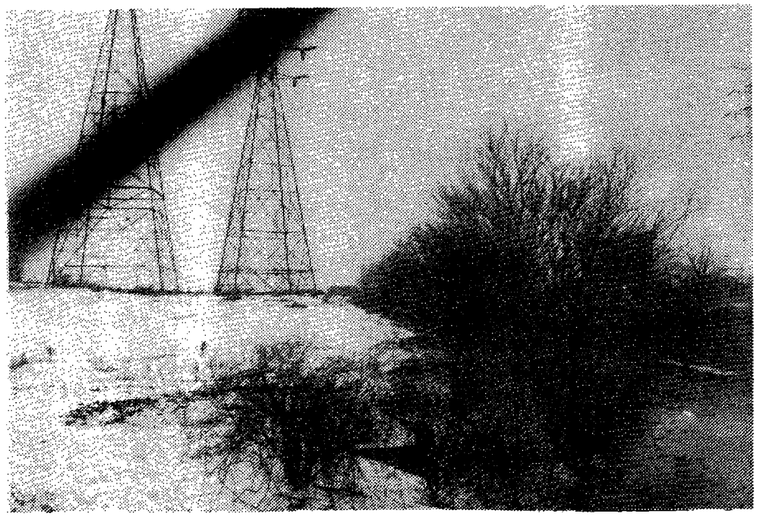
3rd Av

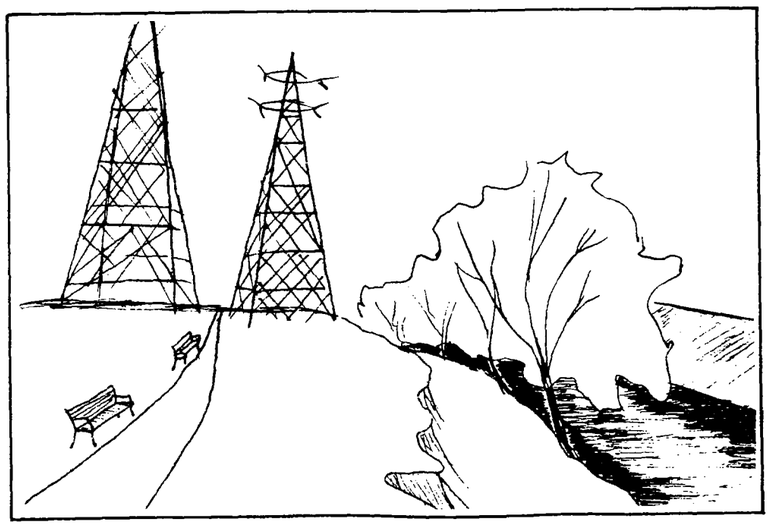
4th Av

5th

6th

Pierce
Fillmore
Polk
Tyler
Harrison
Van Buren
Jackson
Monroe
Madison
Jefferson
Adams
Washington
Massachusetts
Connecticut
Pennsylvania
Delaware
Maryland Av
Carolina
Georgia
Vermont
Kentucky





Development Opportunities

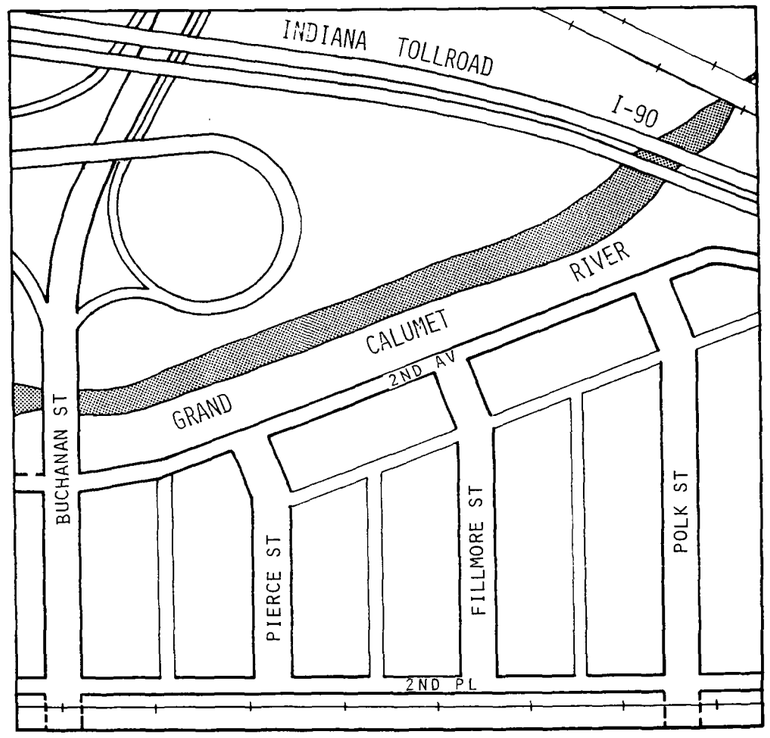
Gary: Downtown West

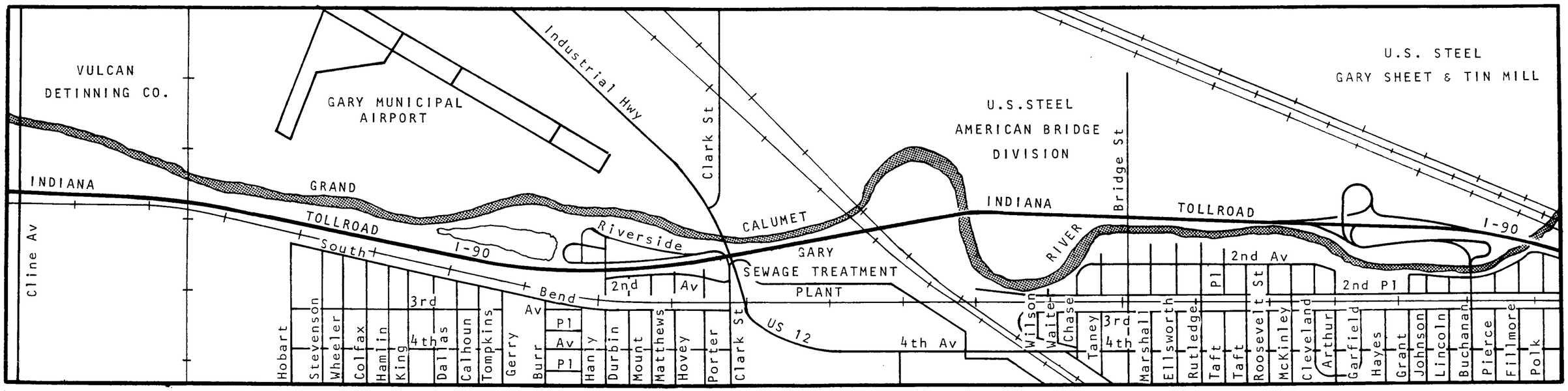
Moving west of Gary's central business district, the Grand Calumet continues to be contained within the boundaries of the U.S. Steel complex, until two-thirds of a mile west of Broadway where it swings back under the tollway at Polk St. Here the river forms the northern border of the western half of the "Downtown West" neighborhood as well as the Ambridge-Mann neighborhood beyond. This stretch of the river offers a great deal of opportunity for the municipality of Gary.

In the Downtown West section of the city, 2nd Av. runs along the south bank of the river, and is separated from the water by a steeply wooded bank about ten feet high. Little bungalows line the south side of 2nd Av. from Polk to Grant streets and face the riverfront. Their vista north across the river is composed of a triangular, grassy expanse about one or two acres in size that serves as an easement for a tollway exit. This area could be landscaped by planting a double line of low-maintenance, densely-leafed trees and shrubs along the expressway to block the view of the interchange. Volunteer groups could be solicited to propagate a prairie in the middle of the triangle, which would offer an ever-changing kaleidoscope of color with very little upkeep. This little pocket could provide a scenic vista and help improve property values for people living along 2nd Av.

From Pierce to Buchanan St. where a bridge crosses the river as an entrance to the toll road, a concrete embankment lines the water's edge north of the river. West of Buchanan the northern bank is less steep than the southern and serves as a staging area for construction equipment related to the tollway. At this point the tollway itself is further off in the distance, and if the intervening land were properly planted, it would provide quite a panorama for people living along the small "bluff" south of the river.

Nature has done its own job of landscaping the riverfront in these neighborhoods--cattails and willows along the water's edge and other hardy trees line the slopes of the banks. If the city undertakes to enhance and expand upon Nature's effort, it might be worthwhile to ask local residents to participate in the planning, installation and upkeep of the plantings. Not only would it give evidence that the city is responding to community needs, it also would bolster neighborhood pride and lessen the chances for damage due to vandalism or neglect.





RESIDENTIAL GARY

0 1400

FEET

Development Opportunities

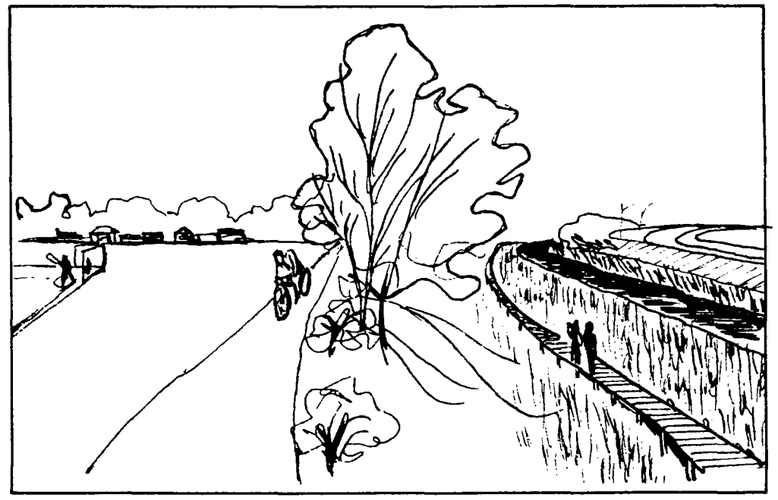
Gary: Ambridge-Mann

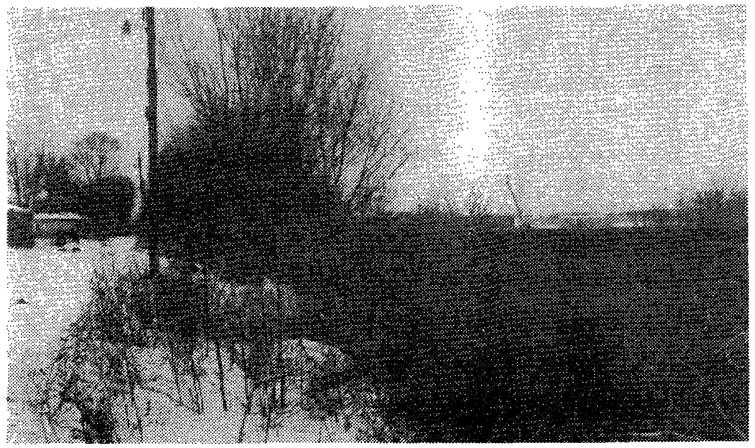
The Ambridge-Mann neighborhood's east and west boundaries are Grant and Chase streets, respectively. At Grant, 2nd Av. (which to this point had run adjacent to the Grand Calumet), turns to the south for a block to encircle Mann-Bridge park. This large neighborhood park abuts the river for two blocks, but it turns its back on the waterway: a dilapidated chain link fence "guards" the park from the wooded riverbank. Ironically enough, the neighborhood itself seems to be turning its back on the park: Instead of peoples' homes facing the park, it is ringed by alleys and the blank walls of garage doors. The park is essentially a collection of playing fields, with bleachers and grandstands for baseball games and similar activities.

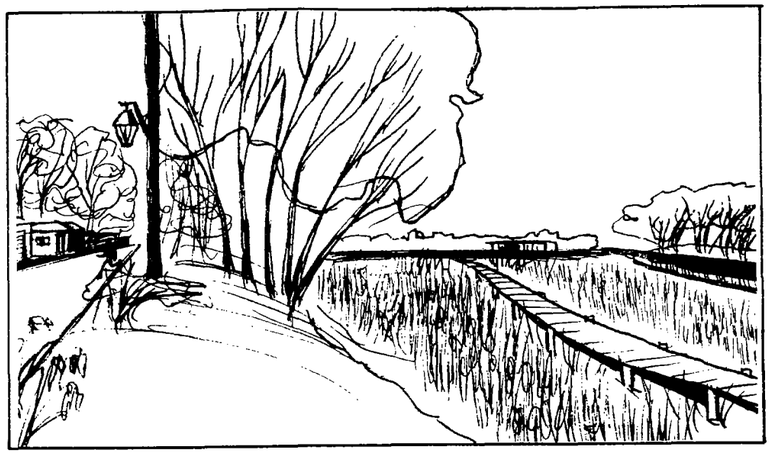
Perhaps both the river and the community would benefit if ways were found to better orient the park to the riverfront, such as by providing canoe launching facilities and running a bike/jogging/ pedestrian path from east to west along the park's northern edge. Unfortunately, the view across the river is less than scenic, for the north bank opposite the park is severely encroached upon by the tollway. Approximately 100 feet inland, an ugly new tollbooth leads to an entrance ramp that sweeps to the west and dominates the riverfront for three or four blocks. Here, the gravel embankment of the tollroad entrance appears to be only 15 to 20 feet away from the water's edge, where the only remaining natural feature is a six-foot-wide stand of hardy cattails. Nevertheless, this should not deter improvement of the south bank.

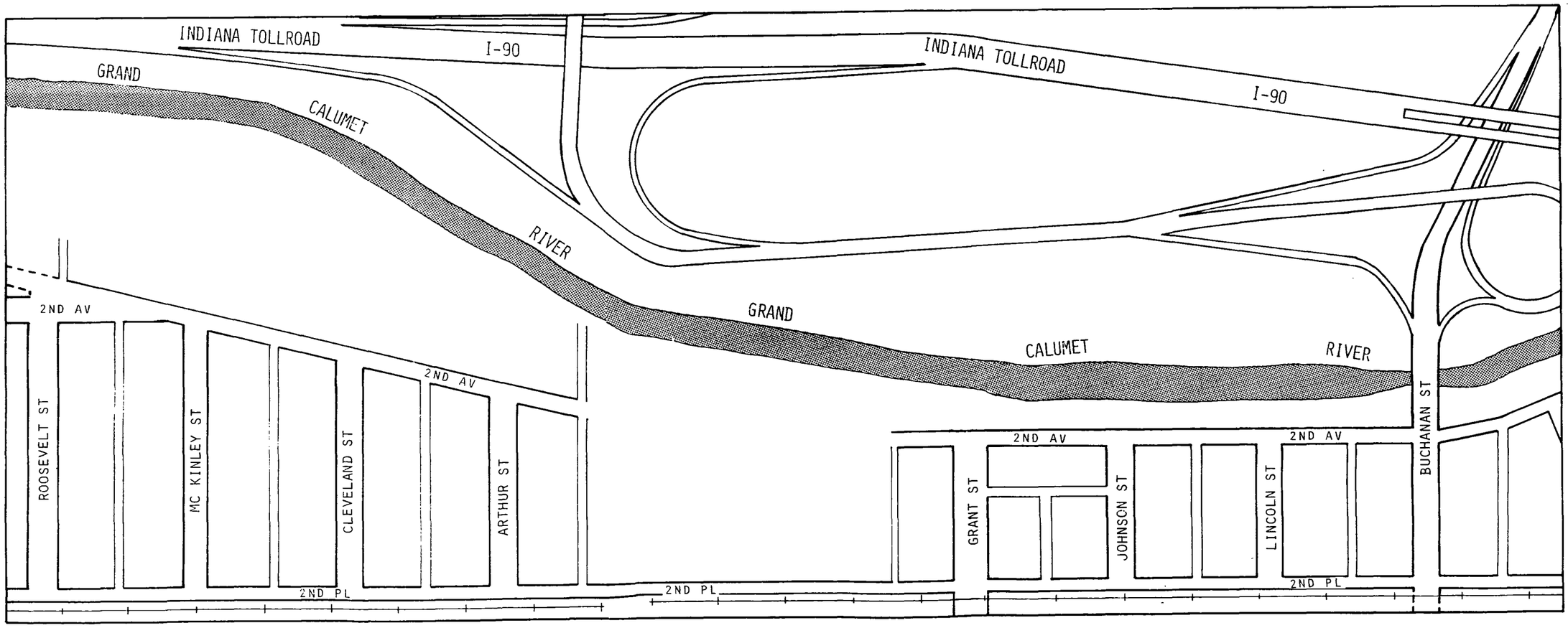
West of Mann-Bridge Park, 2nd Av. swings back north and continues on. Here, a new opportunity presents itself, for 2nd Av. no longer borders the river. Residences line both sides of the street, but between their backyards and garages runs an alley which fronts right on the riverbank. Across the river, the bank is given over to a small strip of willows, ailanthus and other scrub trees bordering the tollway, but the southern bank holds a great, great deal of promise.

At first, a rusty fence topped with barbed wire separates the alley from the water's edge, but at mid-block the topography slopes down from the alley into what appears to be a thriving floodplain and wetland area that extends out at least 50-100 feet from the alley. This alley is invaluble in that it provides a continuous means of open and public access to the river, ideal for bike and pedestrian use. At Roosevelt St. this alley turns southward again and rejoins 2nd Av. At this juncture (the northwest corner of Roosevelt and 2nd) an open undeveloped acreage of perhaps four full city lots (about two acres of land) faces the river. It is dotted with scrub oak and weeds and forms a gateway to the next stretch of riverfront in Ambridge-Mann.








INDIANA TOLLROAD
I-90
INDIANA TOLLROAD
I-90
GRAND
CALUMET
RIVER
GRAND
CALUMET
RIVER
2ND AV
2ND AV
2ND AV
2ND AV
ROOSEVELT ST
MC KINLEY ST
CLEVELAND ST
ARTHUR ST
GRANT ST
JOHNSON ST
LINCOLN ST
BUCHANAN ST
2ND PL
2ND PL
2ND PL

Development Opportunities

Gary: Ambridge-Mann/Brunswick

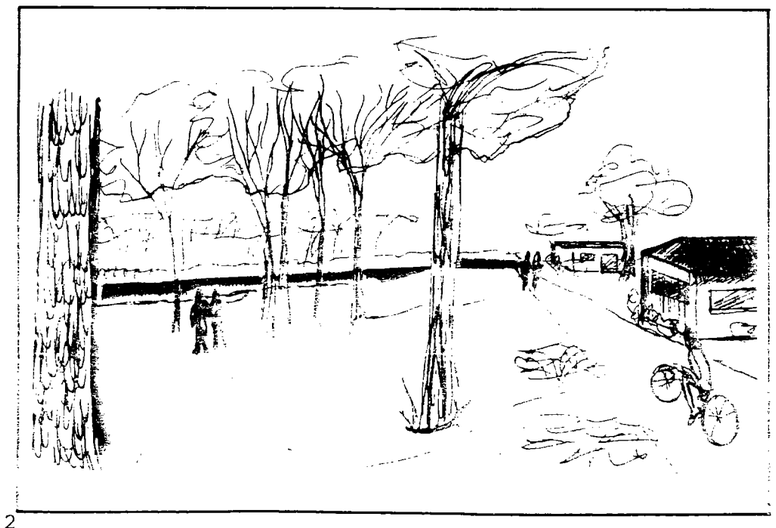
For this stretch, from Roosevelt to Bridge Street, the natural aspect of the residential south bank of the Grand Calumet is at its most extensive.

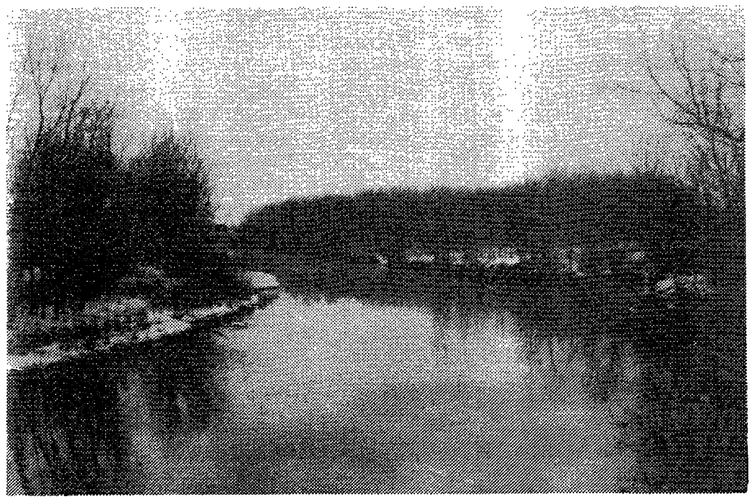
The north-south streets in this area dead-end approximately thirty feet from the river, where a strip of wetlands leads to floodplain forest vegetation that grows next to the houses and yards. At this point, the overall quality of the neighborhood improves; the lots seem better kept up, the homes in better repair, and there is an almost suburban aspect about the neighborhood. From the ends of each street the land slopes gently downwards and there is plenty of room for a pleasant east-west walk on solid ground. Such a path could be used for a jogging track or other passive recreation that would be more appropriate if such a path were paved with wood chips or cinders rather than asphalt, due to its uneven, winding character. (The bike path which could run continuously through this community, would remain on 2nd Av. for this stretch so as not to intrude on the small-scale, woodland character of this setting.)

The river here is fairly broad and bordered on both sides by cattails, which could survive the construction of a narrow boardwalk through the marshy area for nature observation. Although the tollway still borders the northern edge of the river, a line of trees along the water's edge provides a visual screen and a sound barrier. Thus, despite the nearness of the highway, the whole place has a serene aspect to it.

Bridge St. becomes a private thoroughfare when it crosses the river and enters the property of American Bridge Co. West of Bridge St. the river makes a loop to the south and soon swings north again, creating a peninsula of land surrounded by water on the south, east and west, and the tollway on the north. As such, it is blocked off from every means of public access and its heavily wooded features appear to make it a prime target for conservation. It seems large enough to support a decent population of wildlife which would be protected because of its isolation. What is needed is a complete natural area survey for this little segment of property, to ascertain whether it should remain inaccessible to visitors. If not, perhaps a pedestrian bridge can be built across to this area, or at least minimum facilities for canoeists (picnic table, trash barrel) if access were permitted only by water.

Across the river on the southern bank, the same treatment used east of Bridge St. can be applied. In fact, a path already has been cut through the low lying floodplain trees. Once again, this whole strip could probably support two levels of activities: a running path up near street level and a more passive level of activity (walking, nature observation, etc.) down on the level of the river itself.

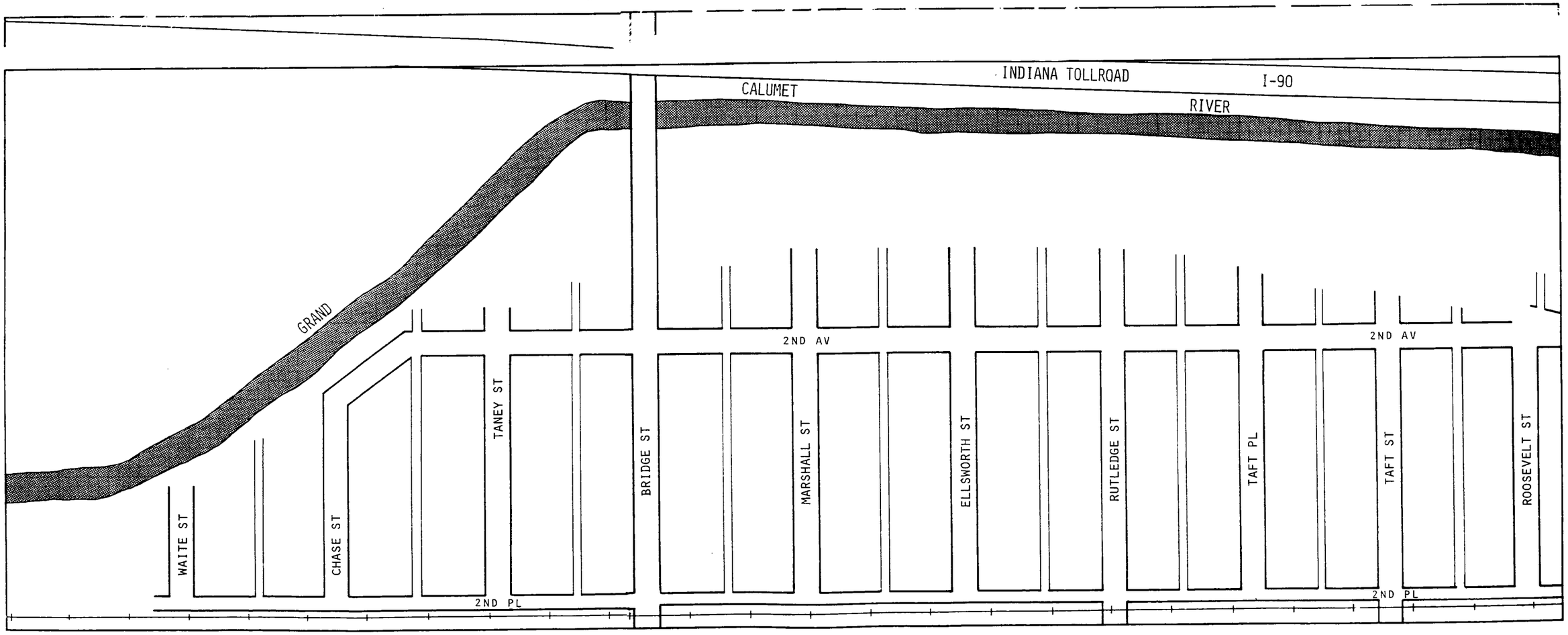




West of Waite St., the neighborhood ends and industrial land use takes over, with staging and parking lots for trucks framing the southern bank of the river as it winds around to the north and ducks under the tollway. After it crosses under the tollway, the Grand Calumet forms another wide loop that creates a mirror image of its curve to the west and south. However, this loop is completely wild in appearance, and is accessible only by walking along the railroad tracks coming from the south. This area is the 65-acre parcel discussed in the U.S. Fish and Wildlife Service report (see appendix) as an outstanding natural area. Its existence has been threatened by the Gary Sanitary District, which may fill it with sludge drying ponds. This area deserves maximum protection.

Continuing west, the river is flanked on the south by the Gary sewage treatment plant, with the tollway rumbling high overhead. At Clark St. the river leaves the shadow of the tollway and it is bordered on the southern edge by a tiny community only a half -mile long from east to west and a few blocks deep. This community is sandwiched in between the river on the north, the tollway on the south, and settling ponds of the Gary Sanitary District on the west. Across the water, the runways of the Gary Municipal airport form the sides of a large right triangle with the river as its base. Here, the land bordering the river has been allowed to retain some of its natural characteristics. The natural assets of this property should be recognized and conserved by the airport authorities.

From the sludge drying ponds to the city boundary, the Grand Calumet is completely separated from the rest of Gary by a double barrier of tollway and the South Shore right-of-way.



Development Opportunities

East Chicago's Riverfront (South Side Neighborhood)

East Chicago has its Kosciuszko Park at 151st and Indianapolis. This is a mature neighborhood park, which offers playing fields, tennis courts, playgrounds, field houses, washrooms, jogging paths, picnic areas, a swimming pool and even a military monument complete with cannon. This adds up to a great variety of uses crammed into a relatively small space, which is even more admirable because of the large number of mature trees which have been allowed to remain on the property. All that this park really needs is a better access to the Grand Calumet.

Directly to the south of the park an industrial concentration impedes any access by pedestrians, but at the park's southwestern corner, near Sophia and Kosciuszko streets, access to the Grand Calumet might be possible.

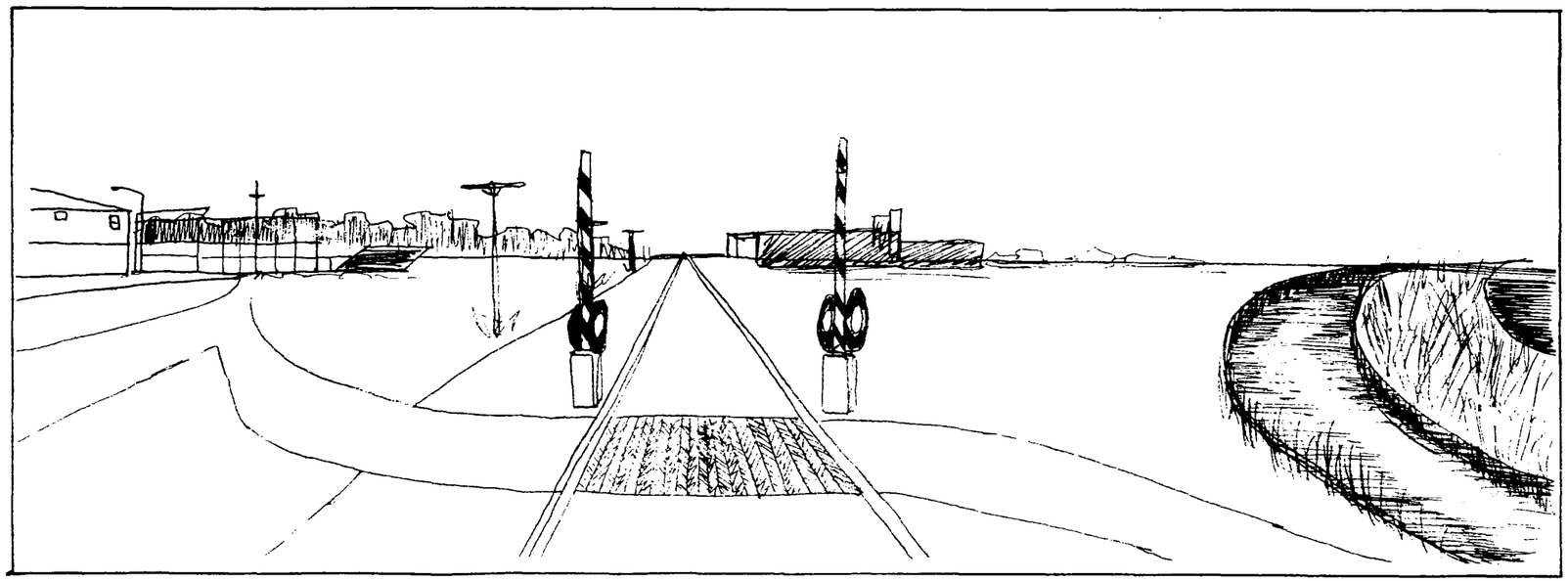
Although two railroad tracks separate the park from the river, they are at grade and, if train traffic is not too heavy, a pedestrian crossing can be installed fairly easily. An automated gate with the usual warning lights and bells would provide appropriate safety precaution for pedestrians funneling out of the park to the riverfront.

Once across the tracks, visitors would be only a few steps from the banks of the Grand Calumet with Roxana Pond and its marshes beyond. In fact, the whole shoreline from the park to the tollway offers many improvement options. The strip between the last row of houses and the water's edge is about 100 feet wide and is essentially open space, sliced along its length by the parallel route of the tracks, an alley alongside the houses, and a cinder access road leading into the marsh area under the tollway platform. A recreational development plan which recognizes the value of the proximity of the river and its natural area of pond and marshes would be a fitting complement to the more urbanized uses of Kosciuszko Park.

East Chicago/Industrial Hammond

East of Indianapolis Blvd., the East Chicago Sanitary District owns the north bank property between the east-west flow of the river and the north-south path of the Indiana Harbor Ship Canal which branches off from it.

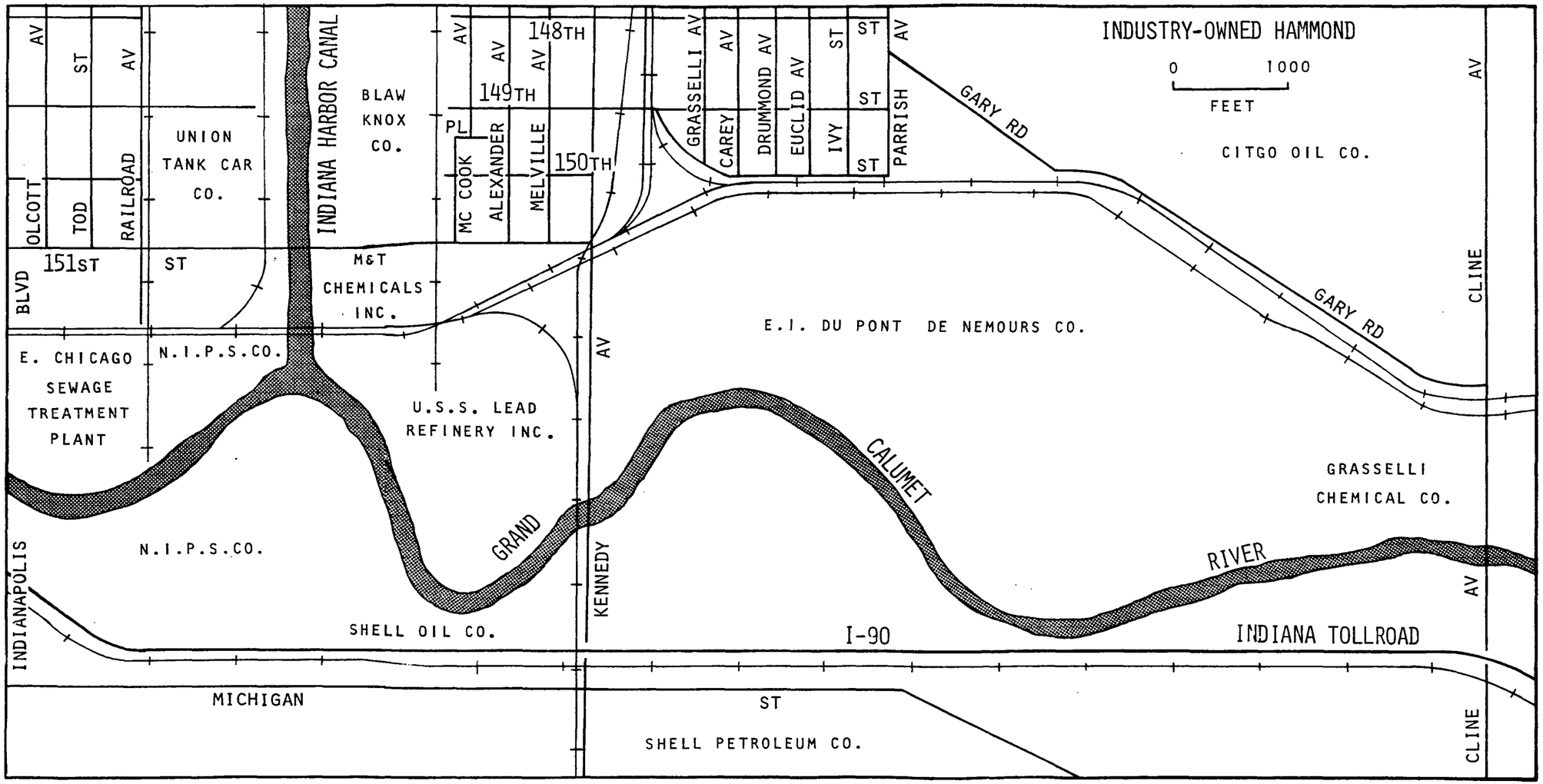
The first bridge across the canal is at 151st St. Here, the western shore is given over to industry, and although a residential area lines the east side of the canal, the houses in the subdivision there turn their backs on the waterway and it is fenced off. Navigation from the main channel of the river up the canal seems unlikely beyond 152nd St. for any craft larger than a canoe, due to the fact that a pipe crossing over the river leaves a clearance of barely three or four feet.



Between Indianapolis and Kennedy Av., the south bank of the river is cut off from public access by a wilderness of high tension lines, telephone poles, the South Shore railroad embankment, and the tollway. Shell Oil Refinery operates a tank farm in approximately half the parcel between the tollway and the river; an electrical transformer station occupies the remaining area nearest Indianapolis Blvd. However, these two property owners are separated by a deeply rutted road that leads from Michigan St. to the riverfront, where an open area can be seen which features scrub vegetation that has been degraded by dumping. This triangular wedge running from Indianapolis to the Shell Oil property also has future development potential, although not as great as some of the other portions of the riverfront. From this vantage point it is also possible to look across to the north side of the river where an extensive wetland separates the main channel from the industrial plants on 151st St.

To the east of Kennedy the duPont Corporation owns the land north of the river and Harbison-Walker Refractories owns the land south. The duPont tract has already been documented in other areas of this report. West of Kennedy, USS Lead owns what could be a major natural area in a peninsula jutting into the river. However, this area has been degraded by the company's dumping practices. It should be a major target for cleanup.

Cline Av. is the next major access point to the Grand Calumet River. It is a very complicated matter of exiting off of this elevated super highway and on to a double back that leads to a rickety bridge over the river. The area east of Cline has been totally despoiled by a huge dump, and perhaps the basic advantage of Cline Av. is that it holds a potential access to the duPont marsh properties.



Development Opportunities

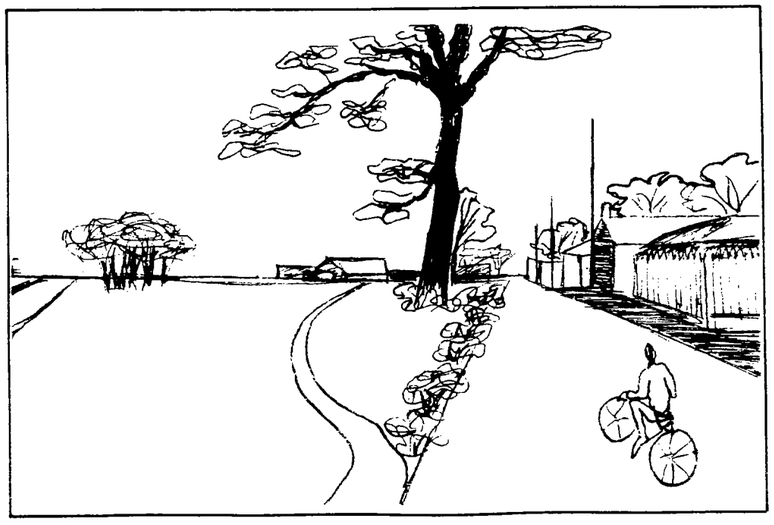
Central Hammond: Calumet East to Columbia

East of Calumet Av. industrial sites abut the river's north bank. South of the river, the tiny back yards of residential bungalows along Wilcox St. drop off suddenly into the wetlands lining the water. As Wilcox continues east, the lots lengthen until there is room enough for another street and an additional row of houses bordering the waterway. As in the Ambridge-Mann neighborhood in Gary, an alley runs behind the houses here for approximately two blocks, all the way to Columbia Blvd. Along this segment, the alley is separated from the river by a fenced-in, 150-foot swath of vacant land. At Columbia Av., a blacktop company and a gas station are south of the river, while a ball diamond has been carved out of the industrial landscape north of the river.

This whole area offers potential for prime recreational development. A variety of scenarios are possible, but the best would probably involve developing the south riverbank into a park whose amenities would best complement those already offered at Columbia Park. The alley could be paved, furnished with attractive lighting, seating and landscaping, and be used as a combination promenade and bike path. The deep lining of wetlands along the riverbank could be protected from pedestrian traffic by building a narrow boardwalk, and when the river's flow improves, the relatively shallow banks would be ideal for small boat-launching facilities.

Hammond's Roxana Neighborhood

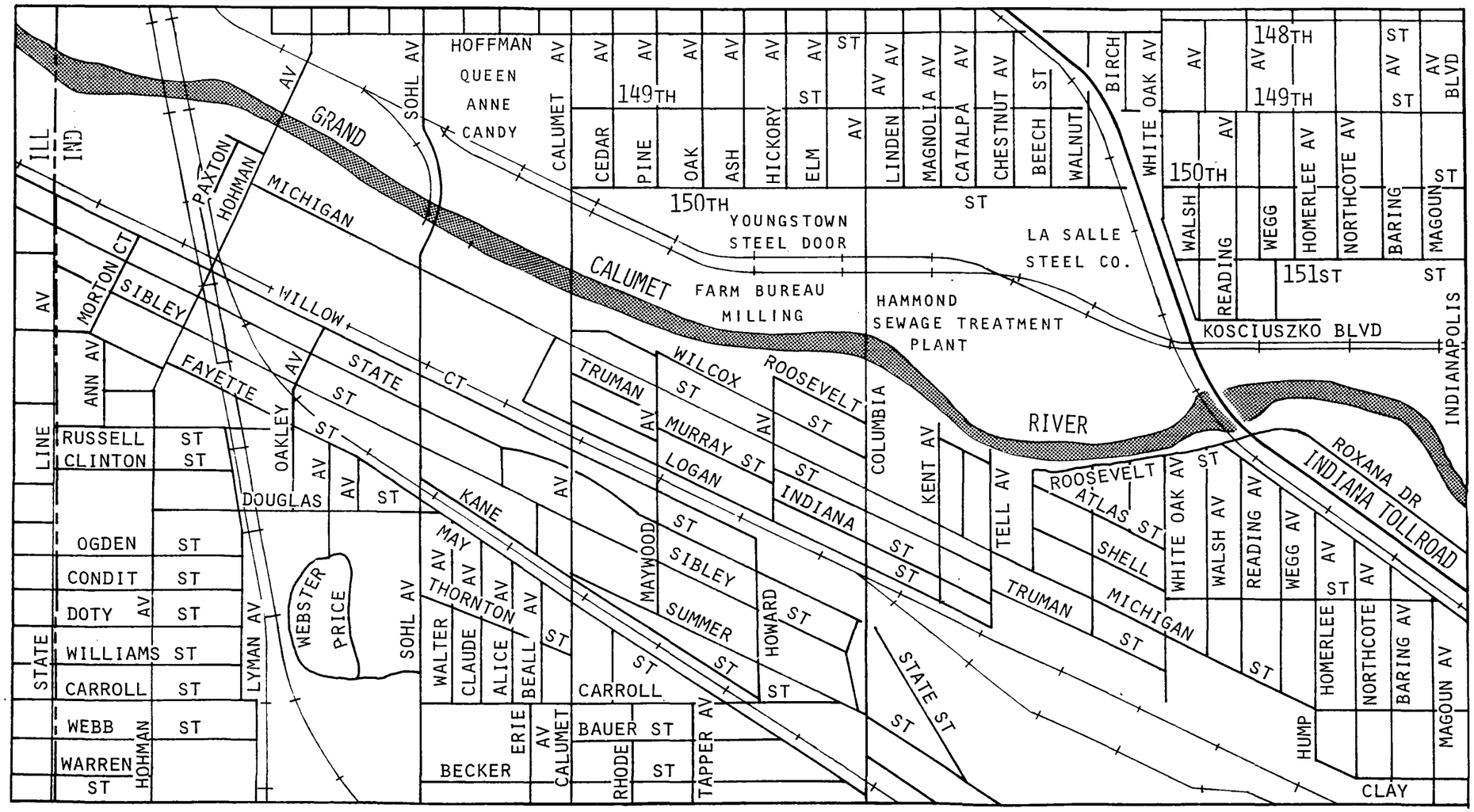
Across Columbia Av., the Hammond Sanitary District owns the property north of the river, while on the south, Columbia Park acts as a gate to the Roxana neighborhood. The park is large, with mature trees. It offers picnic and ball-playing facilities, a field house and a playground. At the northeast corner of the park, Roosevelt St. (which runs along the river) originally narrowed and turned a corner to enter Kent St. on the eastern edge of the park. This means of access has since been blocked by a street



barrier, but could easily be reopened or redesigned to allow the free passage of people and bikes all along the south bank.

The lovely and quiet Roxana neighborhood would benefit from a rehabilitation of the south riverfront, which has suffered greatly from the dumping of garbage and the many overflows of sludge from the Hammond sewage treatment plant. In this section, a narrow bank vegetated by trees and cattails separates Roosevelt street from the water. Near White Oak Av., a children's playground is the main recreational offering on the river's south bank. Extensive wetlands lie across the river, bounded by the sanitary district property. This wetland continues eastward under the tollway to become part of the Roxana marsh complex, which is discussed in detail in the *natural areas* inventory of this report.

From the tollway all the way east to Indianapolis Blvd. the area south of the river provides an immediate opportunity for expanded open space use. Here, the Knights of Columbus have provided a neatly maintained picnic area, and the land under the NIPSCO right-of-way should be made available to more intensive recreational use. A boardwalk near the marsh leading to a canoe-launching facility would be an addition worth considering.



CENTRAL HAMMOND

0 1000

FEET

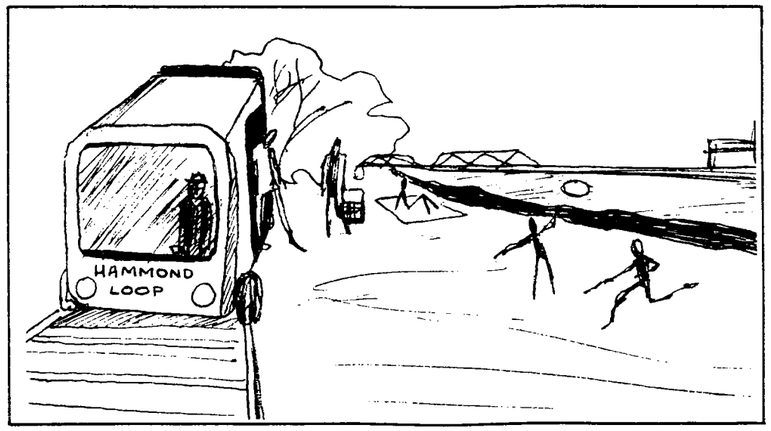
Development Opportunities

Central Hammond: Downtown and West

Hammond's central business district seems to have abdicated its power to a newer concentration of supermarkets, fast food restaurants and discount cigarette and liquor marts that are clustered near the state line, a block west of the former main street, Hohman Av. The stretch of remaining retail along Hohman might well benefit from a revitalization of the Grand Calumet riverfront, which lies three blocks to the north. Currently, a series of railroad tracks and sidings separate the two zones, but plans are underway for the city to build a bridge over these tracks, thus removing the barrier.

West of Hohman Av. the river winds sluggishly through a continuous industrial sector. At this point, the river's flow appears to be moving in a westward direction although cross currents are caused by the movement of strong winds on the water's surface. The riverbanks are lined with deposits of sediment on which cattails grow. Beyond the banks, piles of scrap metal, rubble, broken concrete and other materials create a visual wasteland. The south bank of the river is given over to warehouses flanked by a thick belt of railroad tracks. Because of this, the neighborhoods of central Hammond have no direct visual or pedestrian access to the Grand Calumet.

However, the river is crossed at several points by old railroad bridges and at one point by a low culvert. The key to opening up this portion of the riverfront lies in an abandoned railroad spur that swings off the main line and loops northward until it runs right along the south bank of the river for more than a quarter mile. When it reaches the next railroad bridge, it swings back south again. Undoubtedly this spur originally served the factories along the river.



In the future, the track could be used as a trolleycar line connecting downtown Hammond with this stretch of riverfront. It could be paralleled by a bike path as well. As if the central business district were to make a comeback, this area might be ideal for recycling as a mixed-used development featuring residential buildings facing landscaped river banks. Under this plan, the trolley would see additional use as a mini-commuter service, transporting residents downtown to work, and taking employees back and forth during lunch hours for riverfront picnics during good weather.

Between this place and the next main river crossing (in Calumet City, Illinois), a three to four acre wetland borders the south bank of the river, mirrored by a similar wetland and pond to the north. These areas might be worth exploring for conservation.

Central Hammond: Downtown and East

East of Hohman Av. the Grand Calumet is bordered on the south for a quarter-mile by subsidized housing projects and on the north by industry. Between Sohl Av. and Calumet Blvd. (Route 41) to the east, the river is faced from both shores by schools. Two major recreational areas--Peoples Park and Turner Park--are the outstanding open space offerings of this stretch of the riverfront.

Peoples Park was originally a dump, cleared by the Marines under the direction of Hammond's Planning Department and landscaped with local volunteer help. The park is largely maintained by a local community group and is an example of a neighborhood park on reclaimed land that is thriving, not because of a large financial investment by any agency, but rather by the sheer determination of neighborhood residents. Peoples Park and Turner Park each have its own "advisory committee" operating on a shoestring budget, which somehow manage year after year to make small improvements and sponsor activities for local residents. Peoples Park has been the site of two Grand Calumet River Festivals, hosted by Lake Michigan Federation's Grand Cal Task Force. These events have been designed to increase local awareness about the river's potential while offering live music, food and games.
Opportunities abound throughout the river basin for community-sponsored riverfront events such as this, which can be actualized through a cooperative effort of local residents and city officials.

APPENDIX

TABLE OF CONTENTS

Appendix

PRIORITY POLLUTANTS

1. *acenaphthene
2. *acrolein
3. *acrylonitrile
4. *benzene
5. *benzidine
6. *carbon tetrachloride (tetrachloromethane)
   *Chlorinated benzenes (other than dichlorobenzenes)
7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene
   *Chlorinated ethanes (including 1,2-dichloroethane, 1,1,1-trichloroethane and hexachloroethane)
10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethene
    *Chloroalkyl ethers (chloromethyl), chloroethyl and mixed ethers)
17. bis(chloromethyl) ether
18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether (mixed)
    *Chlorinated naphthalene
20. 2-chloronaphthalene
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. *chloroform (trichloromethane)
24. *2-chlorophenol
    *Dichlorobenzenes
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
    *Dichlorobenzidine
28. 3,3-dichlorobenzidine
    *Dichloroethylenes (1,1-dichloroethylene and 1,2-dichloroethylene)
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. *2,4-dichlorophenol
    *Dichloropropane and dichloropropene
32. 1,2 -dichloropropane
33. 1,3-dichloropropylene (1,3-dichloropropene)
34. *2,4-dimethylphenol
    *Dinitrotoluene
35. 2,3-dinitrotoluene
36. 2,6-dinitrotoluene
37. *1,2-diphenylhydrazine
38. *ethylbenzene
39. *fluoranthene
    *Haloethers (other than those listed elsewhere)
40. 4-chlorophenyl phenyl ether
41. 4-bromophenyl phenyl ether
42. bis(2-chloroisopropyl) ether
43. bis(2-chloroethoxy) methane
    *Halomethanes (other than those listed elsewhere)
44. methylene chloride (dichloromethane)
45. methyl chloride (chloromethane)
46. methyl bromide (bromomethane)
47. bromoform (tribromomethane)
48. dichlorobromomethane
49. trichlorofluoromethane
50. dichlorodifluoromethane
51. chlorodibromomethane
52. *hexachlorobutadiene
53. *hexachlorocyclopentadiene
54. *isophorone
55. *naphthalene
56. *nitrobenzene
    *Nitrophenols (including 2,4-dinitrophenol and dinitrocresol)
57. 2-nitrophenol
58. 4-nitrophenol
59. *2,4-dinitrophenol
60. 4,6-dinitro-o-cresol
    *Nitrosamines
61. N-nitrosodimethylamine
62. N-nitrosoliphenylamine
63. N-nitrosodi-n-propylamine
64. *pentachlorophenol
65. *phenol
    *Phthalate esters
66. bis(2-ethylhexyl) phthalate
67. butyl benzyl phthalate
68. di-n-butyl phthalate
69. di-n-octyl phthalate
70. diethyl phthalate
71. dimethyl phthalate
    *Polynuclear aromatic hydrocarbons
72. benzo(a)anthracene (1,2-benzanthracene)
73. benzo(a)pyrene (3,4-benzopyrene)
74. 3,4-benzofluoranthene
75. benzo(k)fluoranthane (11,12-benzofluoranthene)
76. chrysene
77. acenaphthylene
78. anthracene
79. benzo(ghi)perylene (1,12-benzoperylene)
80. fluorene
81. phenanthrene

82. dibenzo(a,h)anthracene (1,2,5,6-dibenzanthracene)
83. indeno (1,2,3-cd) pyrene (2,3-o-phenylenepyrene)
84. pyrene
85. *tetrachloroethylene
86. *toluene
87. *trichloroethylene
88. *vinyl chloride (chloroethylene)

Pesticides and Metabolites

89. *aldrin
90. *dieldrin
91. *chlordane (technical mixture and metabolites)

*DDT and Metabolites

92. 4,4-DDT
93. 4,4-DDE (p,p'-DDE)
94. 4,4-DDD (p,p'-TDE)

*endosulfan and metabolites

95. a-endosulfan-alpha
96. b-endosulfan-beta
97. endosulfan sulfate

*endrin and metabolites

98. endrin
99. endrin aldehyde

*heptachlor and metabolites

100. heptachlor
101. heptachlor epoxide

*hexachlorocyclohexane (all isomers)

102. a-BHC-alpha
103. b-BHC-beta
104. g-BHC (lindane) Gamma
105. d-BHC-Delta

*polychlorinated biphenyls (PCBs)

106. PCB-1242 (Aroclor 1242)
107. PCB-1254 (Aroclor 1254)
108. PCB-1221 (Aroclor 1221)
109. PCB-1232 (Aroclor 1232)
110. PCB-1248 (Aroclor 1248)
111. PCB-1260 (Aroclor 1260)
112. PCB-1016 (Aroclor 1016)
113. *Toxaphene
114. *Antimony
115. *Arsenic
116. *Asbestos
117. *Beryllium
118. *Cadmium
119. *Chromium
120. *Copper
121. *Cyanide
122. *Lead
123. *Mercury
124. *Nickel
125. *Selenium
126. *Silver
127. *Thallium
128. *Zinc
129. **2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

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*Specific compounds and chemical classes as listed in the Consent Decree.
**This compound was specifically listed in the Consent Decree. Because of the extreme toxicity (TCDD), we are recommending that laboratories not acquire analytical standard for this compound. (37).

(Excerpted from the International Joint Commission's "A Review of the Municipal Pollution Abatement Programs in the Great Lakes Basin," Appendix C.)

COMPARISON OF SELECTED POLLUTANTS MEASURED IN THE

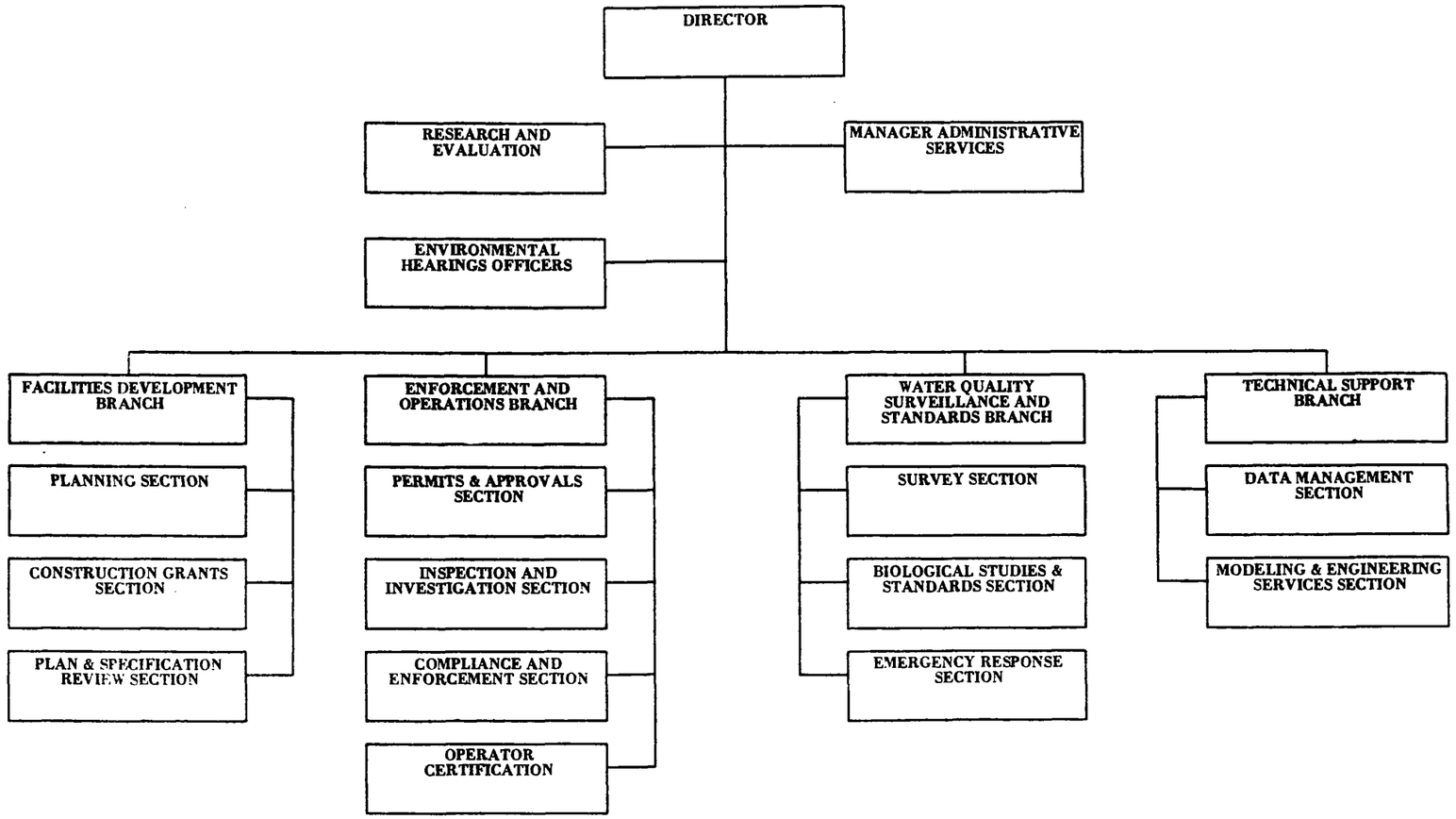
GRAND CALUMET RIVER - 1976 and 1982

(STATION GCR 34)

		Ammonia (mg/1)	BOD (mg/1)	Cadmium (ug/1)	Chlorides (mg/1)	Fecal Coliform (number/100 ml)	Cyanide (mg/1)	DO (mg/1)	Iron (mg/1)	Lead (ug/1)	Mercury (ug/1)	Oil & Grease (mg/1)	Phenol (ug/1)	Suspended Solids (mg/1)
AVERAGE CONCENTRATION	1976	11.68	24.7	10.0	123	17,971	.052	3.6	1.6	81	.218	12.2	15	75
	1982	7.19	38.0	2.0	108	111,954	.017	1.9	2.35	116	1.180	6.3	8	83
MAXIMUM CONCENTRATION	1976	28.00	60.0	10.0	190	120,000	.220	7.6	4.6	120	.500	15.0	41	440
	1982	13.00	100.0	2.0	130	350,000	.039	3.2	6.50	510	3.500	12.1	15	220
MINIMUM CONCENTRATION	1976	3.10	7.2	10.0	94	10	.004	.2	.5	40	.100	8.6	2	16
	1982	2.00	8.3	2.0	55	5,500	.005	.1	.54	10	.200	1.7	5	22

(Data compiled from Water Quality Monitoring - Rivers & Streams, Water Pollution Control Division, Stream Pollution Control Board, State Board of Health, 1976 and 1982.)

DIVISION OF WATER POLLUTION CONTROL



(Chart adapted from Indiana State Board of Health, Organization and Functions, 1980.)

STREAM POLLUTION CONTROL BOARD
OF THE STATE OF INDIANA

330 IAC 2-2

(Formerly Regulation SPC 7R3)

Grand Calumet River and Indiana Harbor Ship Canal

Cited in: 330 IAC 2-2-1; 330 IAC 2-2-2; 330 IAC 2-2-4; 330 IAC 2-2-7; 330 IAC 2-2-8.

330 IAC 2-2-1 Application of rule

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-1; IC 13-1-3-7; IC 13-7-7-5

Sec. 1. The water quality standards established by this Regulation *[330 IAC 2-2]* shall apply to all waters of the Grand Calumet River and the Indiana Harbor Ship Canal. For purposes of this Regulation *[330 IAC 2-2]*, the eastern-most point of the Grand Calumet River is defined as

beginning at the outfall of the five-foot diameter conduit located near the southeast corner of Section 35, T37N, R8W, in Lake County, Indiana. *(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 1; filed May 26, 1978, 3:30 pm: 1 IR 96)*

330 IAC 2-2-2 Nondegradation policies

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-7; IC 13-7-4-1; IC 13-7-5-1

Sec. 2. Nondegradation Policies. The following policies of nondegradation are applicable to all waters of the Grand Calumet River and the Indiana Harbor Ship Canal:

(a) General. For all waters existing instream beneficial uses shall be maintained and protected. No degradation of water quality shall be permitted which would interfere with or become injurious to existing uses.

(b) Higher Quality Waters. All waters whose existing quality exceeds the standards established herein, as of the date on which this regulation *[330 IAC 2-2]* becomes effective, shall be maintained in their present quality unless and until it is affirmatively demonstrated to the Board that limited degradation of such waters is justifiable on the basis of necessary economic or social factors and will not interfere with or become injurious to any beneficial uses made of, or presently possible, in such waters. In making a final determination under this subsection, the Board shall give appropriate consideration to public participation and intergovernmental coordination.

(c) Any determination made by the Board, in accordance with Section 316(a) of the Federal Water Pollution Control Act Amendments of 1972 (FWPCA), concerning alternative thermal effluent limitations, will be considered to be consistent with the policies enunciated in this section.

(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 2; filed May 26, 1978, 3:30 pm: 1 IR 96)

330 IAC 2-2-3 Water use designation

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-7; IC 13-7-5-1

Sec. 3. Water Use Designation. The Board is cognizant that the Grand Calumet River and the Indiana Harbor Ship Canal predominantly comprise treated wastewaters and wastewaters of nonpoint source origin, such as stormwater overflow from the preponderantly urbanized area which these streams traverse, and that, historically, a major function of these streams has been the conveyance of waters of such character. Upon consideration of these factors as well as the unnatural character of these stream beds and the further recognition that, even if all wastewaters discharged to these streams are provided the highest degree of treatment technologically and economically feasible, these streams may not be capable at all times of sustaining a well-balanced fish community, the Board classifies the waters of the Grand Calumet River and the Indiana Harbor Ship Canal for partial body contact, limited aquatic life and industrial water supply. *(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 3; filed May 26, 1978, 3:30 pm: 1 IR 97)*

330 IAC 2-2-4 Mixing zones

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-7; IC 13-7-5-1

Sec. 4. Mixing Zones. (a) All water quality standards in this Regulation *[330 IAC 2-2]*, except those provided in subsection 5(a) *[330 IAC 2-2-5(a)]* below, are to be applied at a point outside of the mixing zone to allow for a reasonable admixture of waste effluents with the receiving waters.

(b) Due to varying physical, chemical, and biological conditions, no universal mixing zone may be prescribed. The Board shall determine the mixing zone upon application by the discharger. The applicability of the guideline set forth in Section 4(c) *[subsection (c) of this section]* will be on a case-by-case basis and any application to the Board should contain the following information:

(1) The dilution ratio;

(2) The physical, chemical, and biological characteristics of the receiving body of water;

(3) The physical, chemical, and biological characteristics of the waste effluent;

(4) The present and anticipated uses of the receiving body of water;

(5) The measured or anticipated effect of the discharge on the quality of the receiving body of water;

(6) The existence of and impact upon any spawning or nursery areas of any indigenous aquatic species;

(7) Any obstruction of migratory routes of any indigenous aquatic species; and,

(8) The synergistic effects of overlapping mixing zones of the aggregate effects of adjacent mixing zones.

(c) Where possible the general guideline is to be that the mixing zone should be limited to no more than ¼ (25 percent) of the cross-sectional area and/or volume of flow of the stream, leaving at least ¾ (75 percent) free as a zone of passage for aquatic biota nor should it extend over ½ (50 percent) of the width of the stream. *(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 4; filed May 26, 1978, 3:30 pm: 1 IR 97)*

330 IAC 2-2-5 Water quality standards

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-7; IC 13-7-4-1; IC 13-7-5-1

Sec. 5. Water Quality Standards. (a) Minimum Water Quality Conditions. All waters at all times and at all places, including the mixing zone, shall meet the minimum conditions of being free from substances, materials, floating debris, oil or scum attributable to municipal, industrial, agricultural, and other land use practices or other discharges:

(1) That will settle to form putrescent or otherwise objectionable deposits;

(2) That are in amounts sufficient to be unsightly or deleterious;

(3) That produce color, odor or other conditions in such degree as to create a nuisance;

(4) Which are in amounts that will be toxic or harmful to human, animal, plant or aquatic life; and,

(5) Which are in concentrations or combinations that will cause or contribute to the growth of aquatic plants or algae in such a degree as to create a nuisance, be unsightly or deleterious or be harmful to human, animal, plant, or aquatic life or otherwise impair the designated uses.

(b) In addition to subsection 5(a) *[subsection (a) of this section]* above, the following standards are for protection of waters of the Grand Calumet River and the Indiana Harbor Ship Canal. They are applicable at any point in the stream outside the mixing zone:

(1) Toxic Substances. Concentrations of toxic substances shall not exceed one-tenth of the 96-hour median lethal concentration for important indigenous aquatic species. More stringent application factors shall be used, when justified, on the basis of available evidence and approved by the Board after public notice and opportunity for hearing.

(2) Persistent or Bioconcentrating Substances. Concentrations of organic contaminants which can be demonstrated to be persistent, to have a tendency to bioconcentrate in the aquatic biota, and are likely to be toxic on the basis of available scientific evidence, shall be limited as determined by the Board after public notice and opportunity for hearing. (Note: For subsections 5(b)(1) and 5(b)(2) *[subsection (b)(1) and this subsection]* the United States Environmental Protection Agency Administrator's Quality Criteria for Water will be among the documents used in establishing water quality standards for toxic and/or persistent substances.)

(3) pH. No pH values below 6.0 nor above 9.0, except daily fluctuations which exceed pH 9.0 and are correlated with photosynthetic activity, shall be permitted.

(4) Dissolved Oxygen. Concentrations of dissolved oxygen shall not be less than 4.0 mg/l at any time.

(5) Temperature.

(aa) There shall be no abnormal temperature changes that may adversely affect aquatic life unless caused by natural conditions.

(bb) Water temperature shall not, at the edge of the mixing zone, exceed the maximum limits in the following table:

Month	Grand Calumet River—Indiana Harbor Ship Canal °F (°C)
January	60 (15.6)
February	60 (15.6)
March	60 (15.6)
April	65 (18.3)
May	75 (23.9)
June	85 (29.4)
July	87 (30.6)
August	87 (30.6)
September	85 (29.4)
October	75 (23.9)
November	70 (21.1)
December	60 (15.6)

(6) Fecal Coliform Bacteria. The fecal coliform bacteria content (either MPN or MF count) shall not exceed a geometric mean of 1,000 per 100 ml, nor exceed 2,000 per 100 ml in more than ten percent of the samples, except during periods of stormwater runoff.

(7) Filterable Residue (total dissolved solids). The filterable residue content shall not exceed 500 mg/l at any time.

(8) Chemical Constituents. The following levels of chemical constituents shall not be exceeded at any time:

Constituent	Concentration	
Total Ammonia Nitrogen	1.5	mg/l
Cyanide	0.1	mg/l
Fluoride	1.3	mg/l
Iron (dissolved)	0.3	mg/l
Phenol	0.01	mg/l
Total Mercury	0.5	ug/l
PCB	0.001	ug/l

(9) Chlorides. The total chloride content shall not average more than 40 mg/l during any 12-month period nor exceed 125 mg/l at any time.

(10) Sulfates. The total sulfate content shall not average more than 75 mg/l during any 12-month period nor exceed 225 mg/l at any time.

(11) Total Phosphorus. The content of total phosphorus shall not exceed 0.10 mg/l at any time except in waters flowing westward into Illinois.

(12) Oil. Oil or similar materials shall not be present in such quantities that they will produce a visible film on the water surface, coat the banks and bottom of the stream or in any way be toxic or harmful to fish or other aquatic life. In addition, the total oil concentration shall not exceed 10.0 mg/l.

(13) Miscellaneous Trace Contaminants and Radionuclides. Miscellaneous trace contaminants and radionuclides shall not, after conventional treatment, be in such levels as to prevent meeting the Drinking Water Standards adopted by the Indiana State Board of Health or which may be adopted by the Environmental Management Board of the State of Indiana.

(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 5; filed May 26, 1978, 3:30 pm: 1 IR 97)

Cited in: 330 IAC 2-2-4.

330 IAC 2-2-6 Analytical procedures

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-7; IC 13-7-5-1

Sec. 6. Analytical Procedures. The analytical procedures used as methods of analysis to determine the chemical, bacteriological, biological, and radiological quality of water samples shall be in accordance with 40 CFR Part 136, the latest edition of Standard Methods for the Examination of Water and Wastewater, or methods approved by the Indiana Stream Pollution Control Board and the Environmental Protection Agency, Water Quality Office. *(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 6; filed May 26, 1978, 3:30 pm: 1 IR 98)*

330 IAC 2-2-7 Definitions

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-16; IC 13-7-1-2

Sec. 7. Definitions.

Application Factor—A numerical factor applied to the median lethal concentration to provide the concentration of a toxic substance that is considered to be safe for organisms in the waters of the state.

Average—Unless otherwise specified, the arithmetical average of a set of numbers.

Board—The Indiana Stream Pollution Control Board.

Effluent—A wastewater discharge from a point source to the waters of the state.

Fecal Coliforms—Coliform bacteria that produce gas from lactose in a special, buffered broth incubated at 45.5° C.

Mixing Zone—An area contiguous to a discharge where, as a result of said discharge, receiving water quality may not meet all water quality standards. Any time an effluent is added to a receiving waterway, where the effluent is poorer in quality, there will be a zone of mixing. The mixing zone should be considered a place where wastes and receiving waters mix and not as a place where effluents are treated.

Partial Body Contact—Any contact with water up to, but not including, complete submergence.

Point Source—A discernible, confined and discrete conveyance, from which wastewater is or may be discharged to the waters of the state.

Policy—As employed herein, a statement of administrative practice or decision-making guidelines to be followed or implemented to the maximum extent feasible with respect to an identified problematic situation but to be less than strictly enforceable in contrast to a standard or rule of law.

Standard—A definite numerical value or narrative statement promulgated by the Board to maintain or enhance water quality to provide for and fully protect a designated use of the waters of the state.

Toxic Substances—Materials which are or may become harmful to plant or animal life, or to food chains when present in sufficient concentrations or combinations.

Waters of the State—Such accumulations of water, surface and underground, natural and artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon this state, but the term does not include any private pond, or any off-stream pond, reservoir or facility built for reduction or control of pollution or cooling of water prior to discharge unless the discharge therefrom causes or threatens to cause water pollution.

Water Use Designations—A use of the waters of the state as established by this regulation *[330 IAC 2-2],* including but not limited to industrial water supply, agricultural use, public water supply, total body contact, partial body contact, fish and other aquatic life. *(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 7; filed May 26, 1978, 3:30 pm: 1 IR 98)*

330 IAC 2-2-8 Severability of rule

Authority: IC 13-1-3-7; IC 13-7-5-1; IC 13-7-7-5
Affected: IC 13-1-3-18; IC 13-7-16-8

Sec. 8. Severability. If any section, paragraph, sentence, clause, phrase, or work of this regulation *[330 IAC 2-2],* or any other part thereof, be declared unconstitutional or invalid for any reason, the remainder of said regulation *[330 IAC 2-2]* shall not be affected thereby and shall remain in full force and effect. *(Stream Pollution Control Board of the State of Indiana; SPC 7R-3,Sec 8; filed May 26, 1978, 3:30 pm: 1 IR 99)*

COMPARISON OF 1973 AND 1978 WATER QUALITY STANDARDS FOR THE GRAND CALUMET RIVER/INDIANA HARBOR CANAL

PARAMETER	REGULATION SPC 7R-2 (1973)	REGULATION 330 IAC 2-2 (1978)
pH	Between 6.5 and 8.5	Between 6.0 and 9.0
Total Dissolved Solids	Maximum 275 mg/l (24-hr. average) Water that flows west to Illinois not to exceed 500 mg/l.	Not to exceed 500 mg/l at any time.
Total Phosphorous	.10 mg/l	Same
BOD (biochemical oxygen demand)	10 mg/l	Standard Eliminated
Oil & Grease	5.0 mg/l	10.0 mg/l
Trace Elements and Radionuclides	Cannot be present in levels that would prevent meeting Drinking Water Standards after conventional treatment.	Same
Ammonia Nitrogen	1.5 mg/l	Same
Chlorides	35 mg/l	Average concentration not to exceed 40 mg/l. Not to exceed 125 mg/l at any time.
Cyanide	0.1 mg/l	Same
Fluoride	1.3 mg/l	Same
Iron (dissolved)	.3 mg/l	Same
Phenol	.01 mg/l	Same
Sulfates	75.0 mg/l	Average concentration not to exceed 75 mg/l. Must not exceed 225 mg/l.
PCB	No standard	.001 ug/l
Persistent or Bioconcentrating Susbstances	No standard	Standards to be formed based on U.S. EPA's Quality Criteria for Water.
Mercury	.005 mg/l	.5 ug/l (.0005 mg/l)

PARAMETER	REGULATION SPC 7R-2 (1973)	REGULATION 330 IAC 2-2 (1978)
Use Designation	Partial body contact, industrial water supply, and limited aquatic life.	Same
General Water Quality Criteria (Including Mixing Zone)	Water shall be free of substances that will: 1) Settle to form putrescent or otherwise objectionable deposits; 2) That are in amounts sufficient to be unsightly or deleterious; 3) That produce color, odor or other conditions in such degrees as to create a nuisance; 4) Which are toxic or harmful to human, animal, plant or aquatic life; and 5) Which are in concentrations or combinations that will cause or contribute to the growth of aquatic plants or algae in such degree as to create a nuisance, be unsightly or deleterious or be harmful to human, animal, plant or aquatic life or otherwise impair the designated uses.	Same
Toxic Substances	Not to exceed .1 of the 96-hr. median lethal concentration for important indigenous species. More stringent standards must be based on evidence, and approval by the Board after public notice and opportunity for hearing.	Same
Dissolved Oxygen	Minimum 3.0 mg/l (24-hr. average) Minimum of 2.0 mg/l at any time.	Not less than 4.0 mg/l at any time.
Fecal Coliform Bacteria	1,000 per 100 ml (geometric mean). Not to exceed 2,000/100 ml in more than 10% of samples, except during periods of stormwater flow.	Same
Temperature	Maximum of 90° F from Oct.-Mar.	Dec.-March 60° F April 65° May 75° June 85° July-Aug. 87° September 85° October 75° November 70° Added - no change in temperature that will adversely affect aquatic life, unless caused by natural conditions.

THE GRAND CALUMET RIVER SYSTEM AS A "CLASS A" AREA OF CONCERN

AREA OF CONCERN	SOURCES AND BOARD EVALUATION ADEQUACY OF REMEDIAL MEASURES	ENVIRONMENTAL PROBLEMS AND CONSEQUENCES	1983 UPDATE - ENVIRONMENTAL CONDITIONS AND REMEDIAL PROGRAMS
Grand Calumet River and Indiana Harbor Canal, Indiana	*2C-Municipal and industrial discharges, combined sewer overflows, industrial waste disposal sites, in-place pollutants with respect to impact on river and harbor **3 -Impact on adjacent nearshore area of Lake Michigan	Harbor sediment severely polluted with nutrients, oxygen-consuming materials, heavy metals; also present--organic chemicals associated with heavy industry. Dredging and navigation restricted. Virtually no fish present; those found are contaminated with PCBs, agricultural and industrial organic chemicals. Few macroinvertebrates, since sediment habitat consists of oily silt and sludge. Water violations for numerous substances. Beach closures resulting from elevated coliform levels. Adjacent nearshore area of Lake Michigan adversely impacted.	Environmental conditions remain unchanged. East Chicago STP not in compliance with NPDES permit, enforcement action in progress. Facility contributes to elevated coliform levels; no influent pretreatment to reduce phenols; ammonia pretreatment requirement not met; no facilities to reduce ammonia. Upgrading and expansion of Gary municipal facilities completed. Combined sewer overflow study completed for cities of Gary, Hammond and East Chicago and is undergoing state review. No plans to eliminate wet-weather combined sewer overflows. Industrial landfills identified; action undertaken under Section 311 of Clean Water Act to contain wastes. Industrial discharges in compliance with NPDES requirements for conventional pollutants; permits being reviewed to determine need for limits on toxics. Indiana water quality standards established to achieve selected uses only. In order to ensure that state water quality standards will be met, study underway to establish municipal and industrial waste load allocations for conventional and other parameters to be permitted by NPDES. No studies proposed to asses impact on Lake Michigan.

* 2C Remedial measures currently in operation will not resolve the identified problems and restore beneficial uses over the near term; however, even though all reasonable remedial measures have been or are being taken, it is doubtful whether the environmental problems will be completely resolved and uses restored.

** 3 Insufficient information has been received or is available to judge whether control measures are adequate, or to decide when such measures may be required.

(Excerpted from "1983 Report on Great Lakes Water Quality," Great Lakes Water Quality Board, Report to the International Joint Commission, Table 5.1)

United States Department of the Interior

FISH AND WILDLIFE SERVICE

IN REPLY REFER TO:

BLOOMINGTON FIELD OFFICE (ES)
718 North Walnut Street
Bloomington, Indiana 47401

November 2, 1983

Mr. Aravind Muzumdar
Director
Gary Sanitary District
P.O. Box 388
Gary, Indiana 46402

Dear Mr. Muzumdar:

This responds to your letter of September 12, 1983, concerning the Gary Sanitary District's proposed sludge landfill. In our letter of July 19, 1982, we recommended that alternate sites be considered and that the 100-acre site east of Clark Street, north of the Grand Calumet River and the N&W Railroad, south of U.S. Steel Corporation, and west of the American Bridge Company buildings not be used. We continue to believe it is inappropriate to utilize this area as a sludge landfill because of the site's value as upland and wetland wildlife habitat and open space.

These comments provide technical assistance only and do not constitute the report of the Secretary of the Interior on the project within the meaning of Section 2 (b) of the Fish and Wildlife Coordination Act, nor do they represent the review comments of the U.S. Department of the Interior on any forthcoming environmental statement.

As stated in our previous letter, the site in question is a modified remnant of the natural land form and vegetation knows as "dune and swale" or "ridge and swale". The tract contains a series of alternating sand dunes and marshy swales oriented in an east-west direction. There are 2 excavated ponds at the east side of the site and cattail marshes (palustrine persistent emergent wetlands) along the Grand Calumet River.

The subject wetland complex and dunes provides important wildlife habitat in an area of the state which is very intensely developed. It supports a diversity of species in large numbers because it is an island of habitat surrounded by industries, railroads, and roadways. Thirty-six species of birds have been observed on the site during short visits, and many more are undoubtedly present as residents or during migration periods. The wetlands and ponds also serve as safe resting areas for waterfowl and gulls during storms that make Lake Michigan too rough for these species. A variety of reptiles, amphibians, and small mammals are also present on the tract.

As indicated in our letter of July 19, 1982, a number of the birds, reptiles and mammals found at the site are uncommon in Indiana or other parts of their ranges. Included in this category are Franklin's ground

squirrel (Spermophilus franklinii), short-eared owl (Asio flammeus), great blue heron (Ardea herodias), red-shouldered hawk (Buteo lineatus), tree swallow (Iridoprocne bicolor), least bittern (Ixobrychus exilis), yellow warbler (Dendroica petechia), American kestrel (Falco sparverius), whip-poor-will (Caprimulgus vociferus), common nighthawk (Chordeiles minor), red-headed woodpecker (Melanerpes erythrocephalus), bank swallow (Riparia riparia), sedge (short-billed marsh) wren (Cistothorus platensis), Blanding's turtle (Emydoidea blandingi), and Eastern massasuaga snake (Sistrurus c. catenatus) (Tate and Tate 1982; Indiana Natural Heritage Program 1983). Of these species, the short-eared owl is considered to be endangered within Indiana (breeding population is in jeopardy of extirpation from the state), the Eastern massasuaga is threatened within Indiana (likely to become endangered in the future if its population levels or habitat conditions decline for any reason), and the remaining species are of Special Concern or on the Watch List (Indiana Natural Heritage Program 1983).

There are several species of special emphasis designated under the U.S. Fish and Wildlife Service's Regional Resource Planning process which are present in the project area. This planning process focuses on migratory birds and endangered species. These species include mallard and great blue heron. Declining habitat has been identified as a problem for these species. Objectives, problems, and strategies for accomplishing these objectives and solving problems for each species of special concern have been established by Region 3 of the Service. Most of the strategies for the species in the project area center around preserving existing habitat and improving this habitat whenever possible. The proposed work definitely conflicts with these strategies.

According to the U.S. Fish and Wildlife Service's Mitigation Policy, promulgated January 23, 1981, the project wetland habitats can be designated Resource Category 2: Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion. The mitigation goal is no net loss of in-kind habitat value. If losses are likely to occur, the Service recommendation is that they be immediately rectified, reduced, or eliminated, such as by replacement of the same kind of habitat value. Specific ways to achieve this include physical modification of replacement habitat to convert it to the same type lost, and restoration or rehabilitation of previously altered habitat. We are not aware of any available land in the area that could be restored or converted to wetlands, but we are willing to discuss this issue with you if 60 acres of such land is available nearby. However, if such land is available, we believe it would be much more appropriate to use it for the sludge beds while leaving the existing wetlands alone.

The project lies within the range of the federally endangered Indiana bat (Myotis sodalis). In Indiana, this species hibernates in caves in the karst region of the state. Research has indicated that in the summer, females migrate throughout their range and form nursery colonies which seek shelter under the loose bark of mature trees. Males stay comparatively closer to the karst areas. Indiana bats forage in wooded areas, primarily along woody riparian corridors. It is not known whether these

bats utilize wetland areas. There is no suitable habitat for this species at the project site because of neighboring developed lands and lack of foraging areas. Therefore, the project will not affect this species.

This precludes the need for further action on this project as required under Section 7 of the Endangered Species Act of 1973, as amended. Should this project be modified or new information indicates endangered species may be affected, consultation should be reinitiated.

Discussion

We remain strongly opposed to use of any of the proposed project area as a sludge landfill because significant wetland wildlife habitat would be destroyed by the project. Furthermore, the wetland performs other valuable functions which would be eliminated or impaired by the work. The area stores and filters runoff from neighboring areas, thus helping reduce flooding problems on adjacent developed lands.

As stated in our 1982 letter, the wetlands are maintained by the high water table in the area and there are freshwater springs in the vicinity. Water quality sampling in the large ponds indicated good quality water that was unaffected by the nearby polluted Grand Calumet River. Available information indicates that groundwater flow in this vicinity is basically from south to north into Lake Michigan. The Calumet aquifer also provides base flow for the area streams. Considering this flow pattern, it is evident that the groundwater quality could be affected over a wide area from any pollution source (Hartke, Hill and Reshkin 1975). Because Clark and Pine Nature Preserve is "downsteam" of the proposed project area, aquifer contamination from the project area could adversely affect this natural area.

According to the Hartke, Hill and Reshkin report (1975), the Calumet aquifer is "particularly susceptible to contamination" because of a combination of a shallow water table and permeable sands. This report also indicates that to provide protection against contamination from a waste storage lagoon, there would need to be a section of clay-loam soil of low permeability 20 feet thick under the lagoon and a minimum depth of 20 feet beneath the pond bottom to the water table. Attachment 1 provides information on this subject as presented in Reshkin et al. (1975). The information you provided to us in 1982 stated that "the proposed diked containment landfill will be built some five feet above the ground water table." If this is still the proposal, it is possible that groundwater contamination could occur. It is also possible that the slag drainage blankets could contribute pollution to the aquifier, depending on the type of slag used. Slag can be high in sulfur, which would leach into the groundwater. It would be necessary to test the slag for sulfur, pH, and leachablility before it could be used. Also, popcorn slag will solidify, so it would not be usable for drainage blankets.

We understand from the Indiana State Board of Health, Water Pollution Control Division, that the quality of the sludge from your treatment

plant is quite good and could be used for land application at an appropriate site where groundwater contamination would be unlikely to occur. We understand that some land application is proposed, but we believe this alternative warrants further investigation so that a smaller sludge landfill would be necessary.

According to the Hartke, Hill and Reshkin report (1975), the Valparaiso Morainal Area (generally between Dyer, Valparaiso, Hebron, and Lowell) is generally suitable for liquid waste storage lagoons (see Attachment 1). We believe it is more appropriate to consider a sludge landfill in this area rather than at the proposed site. However, if costs preclude construction in this area, other alternative locations would be abandoned housing developments or factory sites that have been extensively modified, both in regard to soil profiles and vegetation. Wildlife habitat losses would likely be minor in these areas, and groundwater contamination problems may be much less because of soil profile modifications.

As stated in our letter of July 19, 1982, a permit under Section 404 of the Clean Water Act and under Section 10 of Rivers and Harbors Act of 1899 may be needed for the proposed project. We recommend that you contact Colonel Raymond T. Beurket, District Engineer, U.S. Army Corps of Engineers, P.O. Box 1027, Detroit, Michigan 48231, concerning the requirements for such a permit.

We have enclosed articles on wetlands and landfills for your information (Attachments 2 and 3).

There have been significant losses of wetlands throughout the nation in the past 100 years due to agricultural drainage, flood control, and development. It has been estimated that between the 1950's and the 1970's, nationally, there has been a net loss of over 9 million acres of wetland (Frayer et al. 1983). Wetland losses in Indiana have been similarly striking, especially in the northwestern part of the state where urban development has accelerated. All that remains are remnants of expansive palustrine wetland complexes along the rivers and streams, in isolated pockets, and in interdunal swales. The scarcity of wetland ecosystems and their importance to wildlife make it necessary to curb development of remnant areas, especially for non-water dependent projects, such as this proposal, for which there are alternatives.

We would be happy to meet with you, representatives of EPA, and other interested parties to discuss this project and possible alternatives. Please contact Ms. Elizabeth Secora at (812) 334-4261 to arrange such a meeting.

Sincerely yours,

David C. Hudak

David C. Hudak
Supervisor

Attachments

NATURAL AREA INVENTORY

OF MARQUETTE PARK

by Ken Klick for the Indiana Division of Nature Preserves

Indiana, Lake County, Gary, NE¼ Section 31, NW¼ Section 32, T37N, R

Marquette Park, a municipal park of the City of Gary. Grand Avenue at Lake Michigan.

Marquette Park, owned by the City of Gary, is a delightful lake-front park extending nearly a half mile inland. Much of the area consists of manicured picnic lawns with ball diamonds, tennis courts and other playground equipment. Large parking lots have been developed to facilitate the great enflux of summertime bathers who use the park.

What makes Marquette Park unique from other city parks is the occurrence of some exceedingly rare plant communities to Indiana.

One of the communities encountered and undoubtly one of the rarest of Indiana is the inter-dunal pond. It can be found west of the parking lot and behind some high dunes which are nearly 50 feet above Lake Michigan.

Occurring at the bottom of a depression, possibly formed by a past blowout, the water level of Lake Michigan (582 feet above sea level) is reached. This pond, rich in calcium and magnesium bicarbonate waters is the niche for a community not much unlike a calcareous fen. Indeed, a great number of plant species occur in both community types.

Disturbance of the natural area appears to be confined where an unauthorized road exists. It is in this area that numerous clumps of Dogwood (Cornus stolonifera) occur. Also here is a large dense stand of Common Reed (Phragmites communis berlandierri).

This, I feel, poses a serious threat to this rare community. The road, which may be better termed a vehicular trail, originates at the main parking lot, near the maintenance buildings.

It should first be blocked off and then begin eradicating the Cornus bushes and Phragmites.

Other sections of this inter-dunal pond show very little signs of disturtance and remain today in fine synecological order.

The following is a specie list of plants observed in the Inter-dunal Pond.

Andropogon scoparius
Aristida intermedia
Aster ptarmicoides
Aster spp.
Betula spp.
Carex viridula
Carex spp.
Cornus stolonifera
Cyperus uvularis
Cladium mariscoides
Eleocharis spp.
Gentiana crinita
Gerardia purpurea
Hypericum kalmianum
Juncus alpinus rariflorus
J. torreji
Linum medium texanum
Lobelia kalmii
Panicum vergatum
Panicum spp.
Prunus pumila
Phynchospora cappillacea
Rosa palustris
Sabatia angularis
Salix spp.
Salix spp.
Scirpus americanus
Phragmites communis
Chara spp.
Nostoc spp.
Scleria verticilliata
Solidago gaminifolia?
Spiranthes cernua
Triglochin maritima
Typha anguetifolia
T. latifolia
Juncus batticus littora
Fragaria virginiana
Calamagrostis canadenses
Eupatorum perfoliatum
Lycopus uniflorus
L. americanus

The Fore-dunes and High Dunes communities are exhibited west of the main parking lot.

Though not as floristically diverse as the inter-dunal ponds these are nonetheless important.

The most important plant species by all odds of the fore-dunes is beachgrass (Ammophila breviligvlata). This prime stabilizer is well adapted in this environment. It forms an extensive fibrous root system and is drought resistant - two prerequisites for such a harsh environment.

Populus deltoides also occurrs frequently on the fore-dunes. It's ability to send out adventitous roots as the trunk becomes buried in sand enables it to survive.

Plant Species Found on Fore-Dunes

Ammophila breviligulata
Asclepias syrica
Calamovilfa longifolia
Helianthus annuus
Oenothera biennis
Prunus pumila
Salix syrticola
Populus deltoides
Panicum virgatum
Rhus radicans
Solidago nemocalis
Solidago racemosa g.
Saponaria officinalis
Vitis reparia

Travelling further inland from the Fore-dunes one encounters the High Dunes. A much greater plant diversity occurrs here, including several plants restricted to the great lake dunal regions. The following are two such species; Solidago racemosa gillmani and Rhus aromatica arenaria.

Disturbances to both the High Dunes and Fore-dunes is associated with the numerous hiking trails. In a few areas the bare sand is developing into blowouts.

Perhaps a single maintained trail would alleviate use of the minor trails.

Plant Species Found on High Dunes

Asclepias syrica
Andropogon scoparius
Anemone cylindrica
Artemisea caudata
Corcopsis palmata
Elymus canadensis
Gragaria virginiana
Monarda fistulosa
Prunus pumila
Poa compressa
Panicum virgatum
Panicum sp.
Prunus virginiana
Populus deltoides
Lithospermum caroliense
Rhus radicans
Solidago altissima
S. racemosa gillmani
S. memoralis
Quercus velutina
Vitis reparia

Furthest from the lake on small dune ridges occur Quercus velutina Savannas. These savannas for the most part have gone far too long without a fire. For this reason a dense understory of shrubs have become manifest. Even if fire were to return, many areas through successional attrition have lost their native prairie flora.

There is , however, a notable exception. The savanna located south of Locust Avenue would benefit greatly from fire. This is especially true at the eastern half of the savanna. Apparently less years have lapsed since the last fire on the south side of Locust that the north side.

Persisting south of Locust Road on some of the drier ridge-tops occur patches of Bearberry (Arctostaphylos uva-ursi coactilis), Cactus (Opuntia compressa) and Flax-leaved Aster (Aster linariifolius).

Also, on the south side, I encountered two clumps of the rare Dwarf Hackberry (Celtis tenuifolia). According to Swink and Wilhelm 1979, this plant is confined only to Lake and Porter Counties of Indiana in the Chicago Region. It was observed growing in a dry prairie opening associating with Arctostophylos uva-ursi and Opuntia compressa.

Additional plant species occurring in the Savanna are:

Aster azures
Acer rubrum
Ascelpias tuberosa
A. strica
Ambrosia arettemissifolia
Aster linarufolius
Aralia nudicaulis
Andropogon scoparius
Acer plantinoides
Aquiljia canadensce
Calamovilfa longifolia
Celastris ocandens
Chenopodium album
Catalpa speciosa
Carex pensylvanica
Celtis occidentalis
Ceanothus americanus
Carex spp.
Cornus racemosa
Diervilla lonicera
Elymus canadenses
Galium pilosum
Euphorbia corollata
Epipactis helleborine

Hydrastis canadenses
Impatiens sp.
Juniperus communis
Helianthus divaricatus
Lithospermum caroliense
Lonicera spp. weedy
Monarda punctata
M. fistulosa
Maianthemum canadensis
Liatris aspera
Lactuca canadenses
Morus alba
Prunus virginiana
Prenanthes alba
Polygonum pensylvanicum
Poa compressa
Phlox pelosa
Rosa carolina
Parthenocissus spp.
Populus deltoides
Polygonatum canaliculatum
Quercus velutina
Q. alba
Rhus aromatica arenaria
R. typhuna
Rubus allegkensis
Solidago caesia
S. nemoralis
S. altisuma
Sassafras albidum
Sorghastrum nutans
Rhus copallina
Smilacina stellata
Smilax (2 spp)
Solidago speciosa
Solanum dulcamera
Tradescantia ohioensis
Taxus sp. 3 years old
Tragopogon pralensis
Vitis reparia
Vaccinium angustifolium
Ptlea trifoliata millis
Ulmus pumila

For the justifiable protection of the natural areas of Marquette Park a formal agreement should be developed with the City of Gary.

The inter-dunal ponds, as well as the surrounding dunes would begin to heal the scars of the past abuse if; 1) the unauthorized road were closed. This would require only minimal material and labor force, 2) A formal trail system, which is properly maintained, would eliminate some of the use of the minor trails.

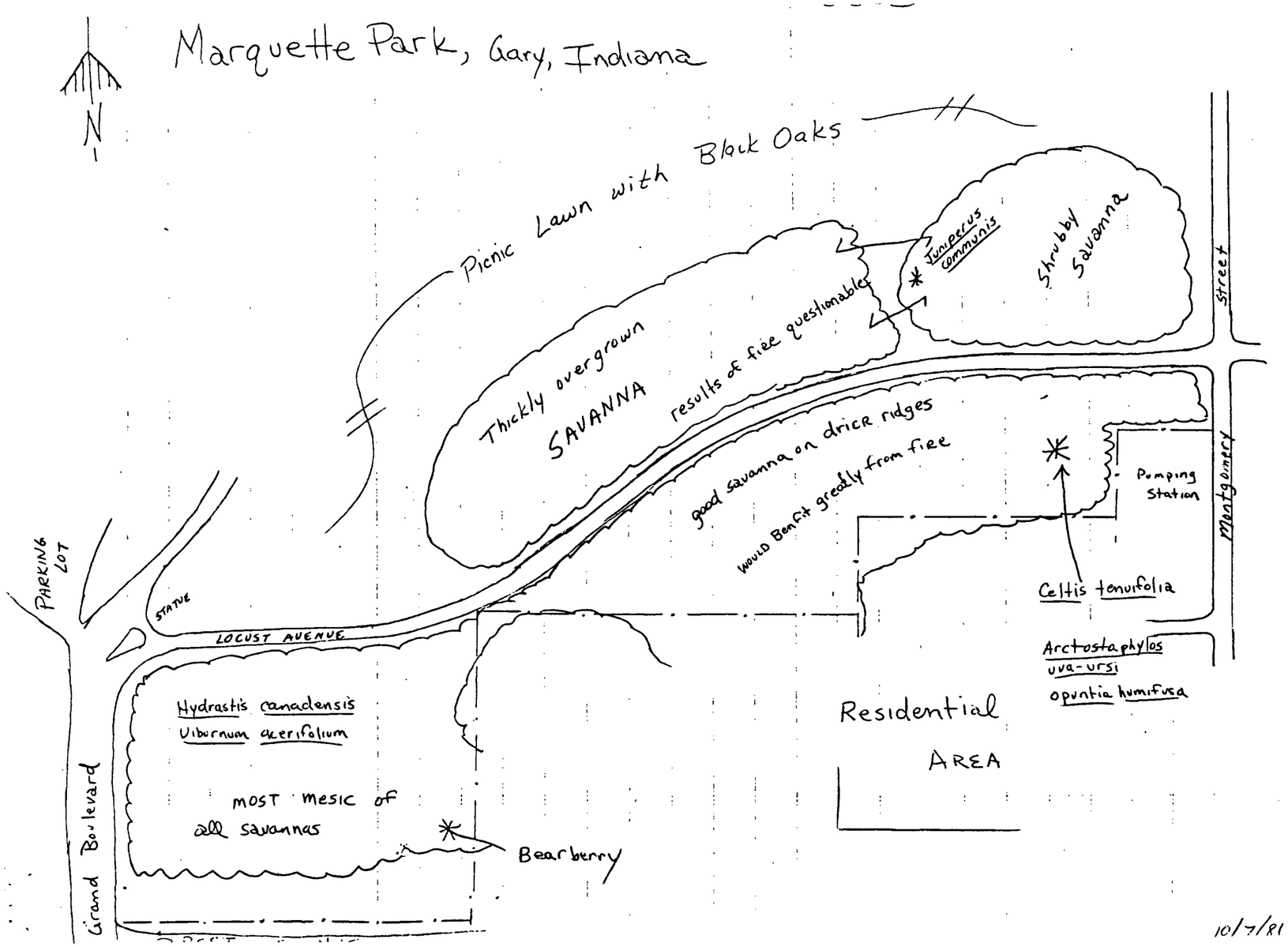
Management of the savannas at Marquette Park may be a bit more controversial. As mentioned earlier, many sections of the savannas have gone far too long without a burning. If it were to return, the results may be a savanna with it's aborescent aspect intact , however, it's ground layer herbs depauperate in diversity.

There is a notable exception to this, namely the savanna located south of Locust Avenue. Here a diverse population of herbs exist that would mainifest and greatly improve with fire.

Unfortunatley this savanna is bordered by residential homes, while the remaining savannas are surrounded by picnic lawns and road, serving ideally as fire barriers.

It may be surprising to park officials of the vastly improved aesthetic quality of Marquette Park if fire is returned. No longer would impenetrable thickets present an unrully "mess" to the visitor. Instead an open "park-like" environment would return to this area with benefits to both the citizens of Gary and the natural area preservationist.

Any additional land clearing for recreational facilities should be regulated through the Department of Natural Resources. This will insure that no sensitive or significant areas are destroyed. Or, if necessary, certain mitigating alternatives may be used.



10/7/81

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RECREATIONAL AND OPEN SPACE WITHIN A ONE-MILE WIDE CORRIDOR OF THE GRAND CALUMET RIVER

CITY: GARY
NEIGHBORHOOD: DOWNTOWN WEST

NAME OF SITE AND ACREAGE	LOCATION	FACILITIES	OTHER NOTABLE FEATURES
Rees Park 1.7	5th Av. between Johnson & Lincoln	Open space	Grassy field with some shade trees and flowers.
Playlot #1 0.1	2nd Av. & Pierce St.	Play facilities Benches	
Jackson Park 4.4	3rd Av. & Jackson St.	Play facilities Swimming pool Basketball courts Baseball diamond (lighted)	Some shade trees.
Gateway Park 9.6	4th Av. & Massachusetts St.	Open space	Just north of downtown Gary. Includes flower gardens and trees.
Jefferson Elemengary School 0.7	6th Av. & Jackson St.	Play facilities Gravel trails	
Borman Park 12.0	7th Av. & Madison St.	Swimming pool Tennis courts Pavilion	
NEIGHBORHOOD: DOWNTOWN EAST			
Jordan Triangle 0.1	5th Av. & Martin Luther King Dr.	Playground	
Buffington Park 8.3	6th Av. & Connecticut St.	Wading pool Pavilion Play facilities	Many trees.
Emerson High School 8.7	6th Av. & Carolina	Baseball diamond Basketball courts Tennis courts	
Spaulding Elementary School (included in above)	Rhode Island St. (shared site with Emerson High School)	Play facilities	

RECREATIONAL AND OPEN SPACE WITHIN A ONE-MILE WIDE CORRIDOR OF THE GRAND CALUMET RIVER

CITY: GARY
NEIGHBORHOOD: AMBRIDGE-MANN

NAME OF SITE AND ACREAGE	LOCATION	FACILITIES	OTHER NOTABLE FEATURES
Vohr Elementary School 1.0	7th Av. & Cleveland St.	Play facilities	Shade trees.
Ambridge Elementary School 3.6	4th Av. & Marshall St.	Open space Baseball diamonds Basketball courts	
Westbrook Ballfield 1.2	Taney St. & 5th Av.	Softball diamond Play facilities	
Horance Mann High School 12.3	5th Av. & Cleveland St.	Baseball diamonds Basketball courts Tennis courts	
Mann-Bridge Park 5.0	2nd Av. & Garfield	Play facilities Baseball diamonds Basketball courts	
NEIGHBORHOOD: MILLER			
Wirt High School 21.9	Grand Blvd. & Birch St.	Football field Baseball diamonds Tennis courts	
Marquette Elementary School 9.0	Huntington & Hemlock Aves.	Play facilities Softball diamond Basketball courts	
Marquette Park 240.9	Grand Blvd. & Lake Michigan	Miller Beach Pavilion Play facilities Boat ramp Baseball diamond Tennis courts Picnicking	Marquette Park Lagoon is is the source of the Grand Cal, and its cleanest segment. Heavily wooded area. winding roads throughout allow vehicular access.
NEIGHBORHOOD: BRUNSWICK			
Tot Lot 0.1	3rd Av & Dallas St.	Play facilities	
Edison Jr. High School 10.0	5th Av. & Burr St.	Baseball diamonds Basketball courts Play facilities	

RECREATIONAL AND OPEN SPACE WITHIN A ONE-MILE WIDE CORRIDOR OF THE GRAND CALUMET RIVER

CITY: EAST CHICAGO
NEIGHBORHOOD (optional):

NAME OF SITE AND ACREAGE	LOCATION	FACILITIES	OTHER NOTABLE FEATURES
Kosciuszko Park 20.5	Indianapolis Blvd & 151st	Tennis courts Basketball courts Baseball diamonds Ice skating rink Swimming pool Football field	
Roxana Park 2.0	Roosevelt St. & Walsh Av.	Tennis court Basketball court Play facilities	Just south of the river near Roxana Pond.

RECREATIONAL AND OPEN SPACE WITHIN A ONE-MILE WIDE CORRIDOR OF THE GRAND CALUMET RIVER

CITY: HAMMOND
NEIGHBORHOOD (optional):

NAME OF SITE AND ACREAGE	LOCATION	FACILITIES	OTHER NOTABLE FEATURES
Turner Field 9.0	Michigan & Sohl	Shelter Baseball diamonds Playground	
People's Park 4.0	Michigan & Sohl	Play facilities Trails Benches Jogging Trail Ice Skating Rink	Grand Calumet River is the north boundary of the park.
Lafayette Elementary School 3.5*	Sibley St. and Calumet Av.	Playground	
Columbia Park 11.9	Columbia Av. & Michigan St.	Playground Playfield Basketball courts Ice Skating Rink Warming House	Walking distance to the riverfront.
Columbia School 1.0*	South of Columbia Park		
Spohn School 18.1*	Calumet Av.	Playground Open Space	Near the north bank of the Grand Calumet.
Irving Elementary School 2.0	Chicago St. & Pine Av.		
Irving Park 10.0	Columbia Av. & Chicago St.	Two tennis courts Picnicking Horseshoe courts Ice Skating Rink Baseball diamonds Shelter	
Triangle Park 0.3	Carroll St. & May St.	Play facilities	

* Acreage given includes the school building(s).

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